AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING
CIVILIAN AND DEFENSE

In This Issue . . . **Air Conditioning and Refrigeration Survey • • • •**

DECEMBER 1, 1952

1953 Packard and Lincoln • • • • Making Dodge V-8 Engine • • • • New Forging Process • • • • London Show • • • • Stainless Steel Aircraft Nacelles

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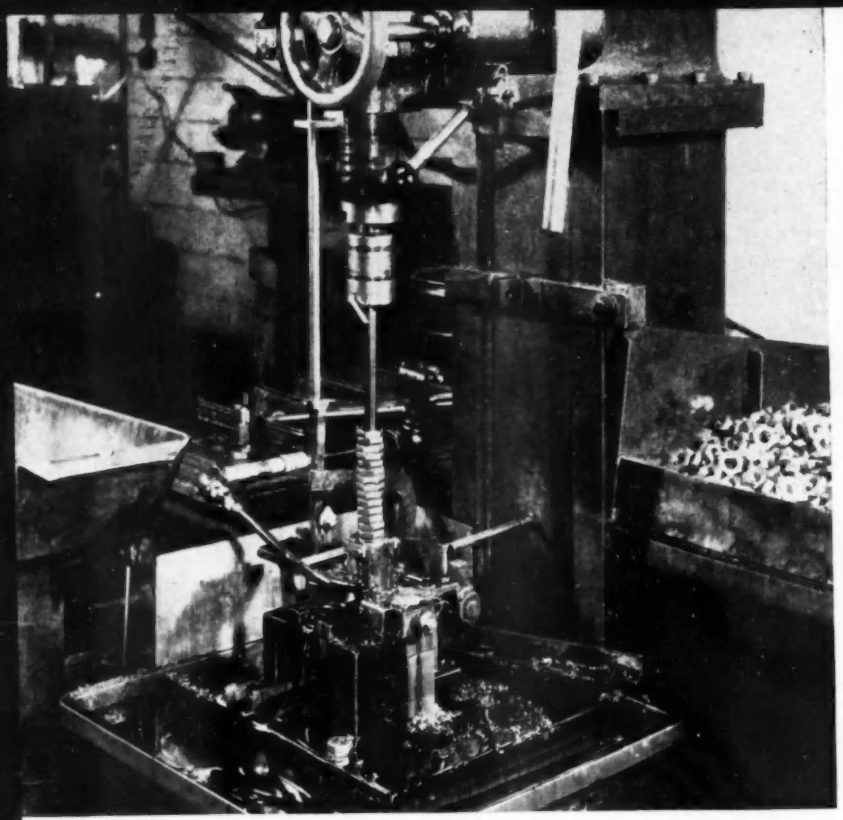
A CHILTON PUBLICATION



What's YOUR problem?

Dave F. Wallace of the Standard Oil office in Saginaw, Michigan, is the lubrication specialist who helped this midwest manufacturer solve a serious problem through the use of STANICUT Cutting Oil.

Like all Standard Oil lubrication specialists, he has a broad background of practical experience plus thorough training in Standard's own schools. And like all lubrication specialists, his on-the-job help is always available. He is one of a corps of experienced men who make their headquarters wherever industry is located throughout the Midwest.

For help with your problem, call for the services of your Standard Oil lubrication specialist today! A call to your local Standard Oil office is all that's necessary.

Tapping problem solved; production boosted 25%

● A midwest manufacturer was having trouble with a thread tapping operation. Performed on the drill press shown above, the job called for the tapping of a ¾-inch threaded hole in nuts made from C-1018 steel stock. The quality of threads tapped was poor. Rejections ran high because of torn threads.

Consulted on this problem, a Standard Oil lubrication specialist recommended the use of STANICUT Cutting Oil 309 BCS. Replacing a conventional cutting fluid, STANICUT turned the tide on troubles. With its use, quality of threads has been excellent. Rejections have been reduced to a minimum. Production has been boosted 25% — an increase of approximately 100 pieces per hour!

STANICUT
TRADE MARK
Cutting Oil

Whatever your cutting oil problem, the Standard Oil lubrication specialist in your section of the Midwest can help you solve it. You can contact him by phoning your local Standard Oil (Indiana) office. Or write: Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

STANICOOL HD SOLUBLE OIL — Because they contain additional compounding, these heavy-duty soluble oils possess not only the cooling ability of an emulsion but also the ability to give better tool life and finer finishes than can be obtained with a conventional soluble oil.

STANOSTAMP COMPOUNDS — Here are three established products for stamping or heavy drawing operations of either low-carbon or alloy steels. Water can be added to these paste compounds to provide the most economical applications. STANOSTAMPS offer maximum protection for dies and work. These compounds can be removed readily in conventional washing equipment.

STANDARD OIL COMPANY STANDARD *(Indiana)*

Specialists in Heavy-Duty!

COTTA REDUCTION UNITS

You can operate one of these Heavy-Duty Cotta Reduction Units continuously in your crane, shovel, rock-crusher, generator, pump, etc., and be sure of getting dependable, trouble-free service over the lifetime of your equipment. Whether you want one, or one hundred, Cotta builds Reduction Gears to your particular requirements . . . in a broad range of ratios . . . with input torques ranging from 150 to 2000 foot pounds. And with Cotta precision-engineering throughout!

THIS INFORMATION WILL HELP YOU

Sent free on request — diagrams, capacity tables, dimensions, and complete specifications. State your problem — COTTA engineers will help you select the right unit for best performance. Write today.

COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS

An Assurance of Dependable Service

COTTA
HEAVY-DUTY REDUCTION UNITS
"Engineered-to-order"

AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

December 1, 1952 Vol. 107, No. 11

Contents

One of the Publications Owned by

CHILTON COMPANY (INC.)

Executive Offices

Chestnut and 56th Streets, Philadelphia 39, Pa., U. S. A.

AUTOMOTIVE INDUSTRIES is a consolidation of The Automobile (weekly) and the Motor Review (weekly) May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

AUTOMOTIVE INDUSTRIES, Vol. 107, No. 11. Published semi-monthly by Chilton Co., Chestnut & 56th Sts., Phila. 39. Entered as Second Class Matter Oct. 1, 1925, at the P.O. at Philadelphia, Pa.; Under the Act of Congress of March 3, 1879. In case of Non-Delivery Return Postage Guaranteed. Subscription price: United States, Mexico, U. S. Possessions, and all Latin-American countries, 1 year $2.00, 2 years, $3.00. Canadian and Foreign, 1 year $5.00, 2 years $8.00; single copies, 25 cents, except Stat. Issue (Mar. 15th), $1.00.

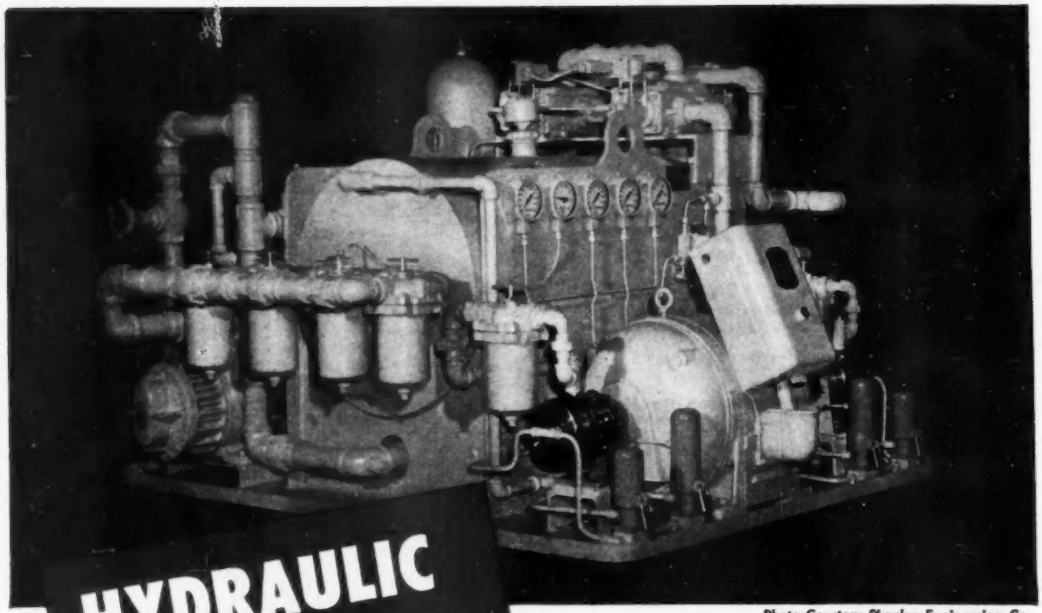


Photo Courtesy Simplex Engineering Co.

HYDRAULIC PUMPS LAST LONGER...

when you use TEXACO REGAL OIL (R & O)

Whatever use you make of hydraulics, make *Texaco Regal Oil (R&O)* your hydraulic medium. One user* reports: *"Texaco Regal Oil (R&O) has kept our hydraulics systems clean . . . enabled us to maintain a non-stop production schedule. We have never had a shutdown due to rust, sludge or foam. Pump wear has been negligible."*

Texaco Regal Oil (R&O) is a turbine-quality oil specially fortified and processed to prevent sludge, rust and foam. Tests show *it has more than ten times the oxidation-resistance of ordinary turbine-quality oil.* With *Texaco Regal Oil (R&O)* you can count on smooth, uninterrupted operation, longer pump life, lower maintenance costs. There is a complete line of *Texaco Regal Oils (R&O)* approved by leading hydraulic manufacturers.

For machining, use *Texaco Cutting, Grinding and Soluble Oils.* Whatever the metal or the method of working it, you can do it better, faster, at lower cost with Texaco.

Let a Texaco Lubrication Engineer help you select the proper Texaco Lubricants to give you the best results at lowest possible cost. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

**Name on request*

TEXACO Regal Oils (R&O)

FOR ALL HYDRAULIC UNITS

Faithfully yours 50 *for Fifty Years*

TUNE IN: Tuesday nights on television—the TEXACO STAR THEATER starring MILTON BERLE. See newspaper for time and station.

Check list for better engine timing

☐ Automatic joint snugness ☐ Smoother operation ☐ Longer life

You get all 3* with Link-Belt Timing Chain

Why segmental bushings provide automatic joint snugness

Segmental bushings are made with slight bow.

After initial assembly in chain, bushings are straight.

Bow in bushing acts to keep a snug joint, maintaining chain pitch automatically.

WHEN you design with Link-Belt Timing Chains and Sprockets, you get exclusive engineering extras that result in smoother operation, longer life. Take a look at the accompanying sketches. They show you how Link-Belt's Segmental Bushings assure automatic joint snugness.

Put the continuing research and unsurpassed facilities of the vast, new Link-Belt plant to work for you. Engineering and specification details are available in Book 2065.

LINK-BELT

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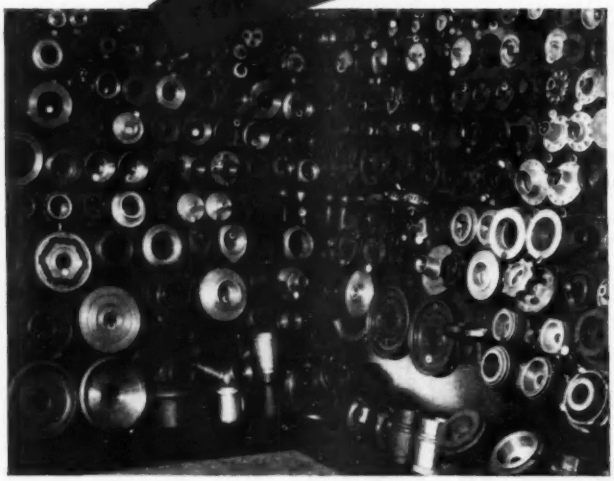
LINK-BELT COMPANY: 220 South Belmont, Indianapolis 6, Ind. Offices in principal cities. 12,741

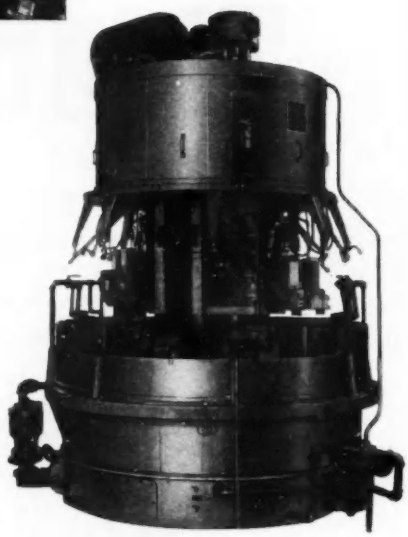
BULLARD MACHINE TOOLS

FOR MANUFACTURING ECONOMY



From the time of the inception of the Mult-Au-Matic back in 1914 these machines in customers' plants have probably machined the largest variety of work of any machine tool. Illustrated herewith are only a few of many hundreds of Mult-Au-Matic jobs. The machine's versatility suits it for nearly any type and shape of work where the operations call for boring, turning, facing, drilling, reaming and threading.

Motor manufacturing which includes pleasure cars, trucks, tractors, mechanical farm equipment and airplane engines is the largest user of these automatic multiple spindle machines. However other manufacturers contributing to the mining, shipbuilding, hydro-electric, ore, railroading, oil, bridge construction industries, scientific developments and modern housing projects have found the economy of Mult-Au-Matic production a large factor in the marketing of their products. Wherever automatic multiple spindle manufacturing can be efficiently used there is a place for Mult-Au-Matics with their attendant savings in manufacturing costs. Bullard engineers are ready to assist in applying Mult-Au-Matic efficiency to your particular manufacturing problems. Let us make a study of your production methods.



For Manufacturing Economy use Mult-Au-Matics. Built in 8-, 12-, 16-, and 34-inch sizes with 4, 6, 8, 12, or 16 spindles according to the specific model.

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This booklet gives complete information on

CORK-AND-RUBBER GASKET MATERIALS

made to meet government specifications

SEND FOR YOUR FREE COPY

The new edition of "Armstrong's Gasket Materials" has complete, up-to-date information on the Armstrong materials made to meet government specifications. You'll find there's an Armstrong composition for each of the 7 types included in the principal government specifications covering cork-and-rubber gasket materials.

In addition, this 24-page manual is full of helpful ideas on gasket design and use. There are sections on designing gaskets to reduce cost . . . practical tolerances for resilient gaskets . . . how to design flanges for efficient sealing . . . and many other subjects.

You can see "Armstrong's Gasket Materials" in Sweet's file for product designers. If you'd like a personal copy, write Armstrong Cork Company, 1512 Arch Street, Lancaster, Pa.

Here is a list of the Armstrong materials made to meet government specifications on cork-and-rubber gasketing.

Specification	Material	Specification	Material
MIL-G-6183			
Type I Soft	NC-709	Type II Soft	DC-167
Type I Medium	NC-710	Type II Medium	DC-100
Type I Firm	NC-711	Type II Firm	DC-113
MIL-T-6841A	DK-153 or RK-304S	MIL-G-6747	DK-149

For detailed information about these compositions and their application, see Sweet's file for product designers or call your nearest Armstrong office listed below.

New cork-and-rubber compounds. Armstrong's Research Laboratories are ready to develop cork-and-rubber materials to meet new military requirements as they arise. Please discuss your needs with your nearest Armstrong representative . . . or write.

Cork compositions. There is an Armstrong cork composition made to meet each of the classes under Federal Specification HH-C-576, as well as all grades under specification MIL-C-16090.

Synthetic rubber compounds. Armstrong manufactures highly specialized synthetic rubber compounds for certain highly critical applications. If you need an out-of-the-ordinary rubber compound, please discuss your problem with your Armstrong representative.

ARMSTRONG'S GASKET MATERIALS

Your nearest Armstrong Industrial Division office

ALBANY 10, N. Y., 268 Spruce St. at Northern Boulevard, Telephone: 4-0131 • BOSTON 16, MASS., 131 Clarendon Street, Telephone: COpley 7-2490 • CHICAGO 54, ILL., 13-136 The Merchandise Mart, Telephone: DElaware 7-0500 • CINCINNATI 2, OHIO, 301 Temple Bar Building, Telephone: PArkway 3220 • CLEVELAND 15, OHIO, 209 Hanna Bldg. Annex, Prospect Ave. and E. 14th Street, Telephone: MAin 1-7900 • DETROIT 26, MICH., 10th Floor, Free Press Building, 321 Lafayette Avenue, West, Telephone: WOodward 3-5670 • GREENVILLE, S. C., 33 Norwood Place, Telephone: Greenville 3-5302 • LOS ANGELES 15, CALIF., 719 Bendix Building, 1206 Maple Avenue, Telephone: RICHmond 0286 • NEW YORK 16., N. Y., 295 Fifth Avenue, Telephone: MUrray Hill 4-6900 • PHILADELPHIA 2, PA., Robinson Building, Fifteenth and Chestnut Streets, Telephone: LOcust 4-4290 • ST. LOUIS 3, MO., 1205 Olive Street, Telephone: CHestnut 1757 • IN CANADA: Armstrong Cork Canada Limited, 6911 Decarie Boulevard, Montreal, Quebec, Telephone: ATlantic 4733.

Eaton Free-Valves

can be applied to engines of all types and sizes

Eaton Free-Valves prevent the formation of stem deposits or uneven seat deposits; prevent local overheating, eliminating the principal causes of guttering; prevent valve stem sticking or scuffing. As a result, Eaton Free-Valves last many times longer. These benefits can usually be applied to an engine without costly design changes. Eaton Free-Valve Kits for motor cars and trucks are available from dealers. Our engineers will be glad to work with you in applying Eaton Free-Valves to your engines.

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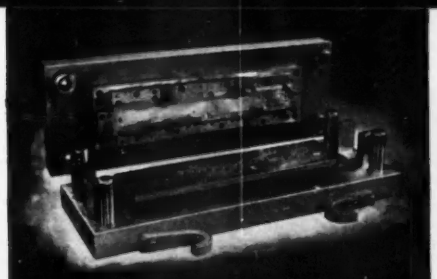
General Offices: CLEVELAND, OHIO

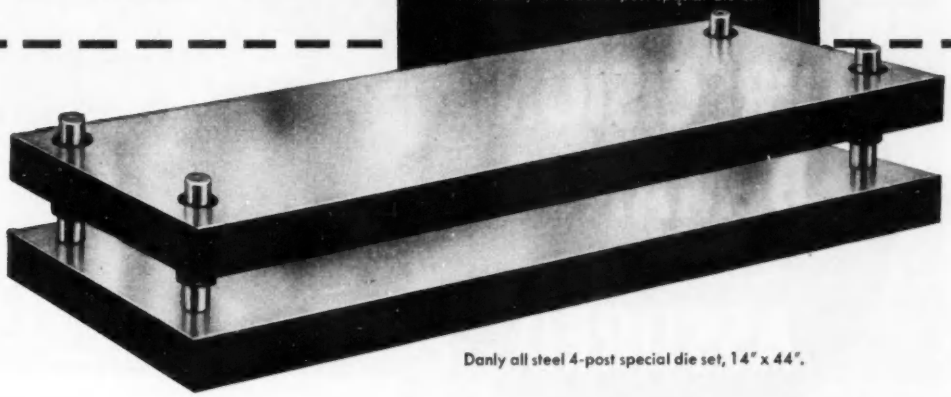
VALVE DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN

PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers



Completed die for blanking a Nash door component—built for longer die life in a Danly all steel 4-post special die set

DANLY SPECIAL DIE SETS



Danly all steel 4-post special die set, 14" x 44".

help Nash meet close production schedules!

Dies play a big part in modern high-speed automobile production. They have to be ready on time when model changes are scheduled and they have to stand up under three-shift operation day in and day out with a minimum of down time. That's why you'll find so many Nash production dies built in Danly Special Die Sets. A Danly set means fast delivery to meet the tooling schedule and a rugged, precise base for the dies that assures maximum die life.

DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue • Chicago 50, Illinois

DANLY SPECIAL DIE SET SERVICE IS FAST AND CONVENIENT —CALL YOUR NEAREST DANLY BRANCH

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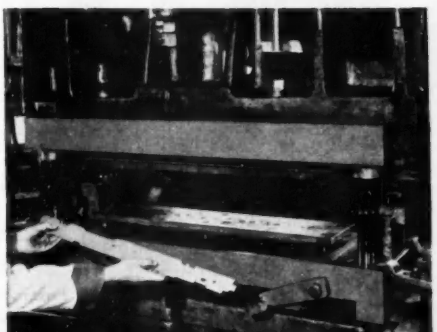
***CLEVELAND**	14	1550 East 33rd Street
***DAYTON**	7	3196 Delphos Avenue
***DETROIT**	16	1549 Temple Avenue
***GRAND RAPIDS**		113 Michigan Street N.W.
INDIANAPOLIS	4	5 West 10th Street
***LONG ISLAND CITY**	1	47-28 37th Street
***LOS ANGELES**	54	Ducommun Metals & Supply Co., 4890 South Alameda
MILWAUKEE	2	111 East Wisconsin Avenue
***PHILADELPHIA**	40	511 W. Courtland Street
***ROCHESTER**	6	33 Rutter Street

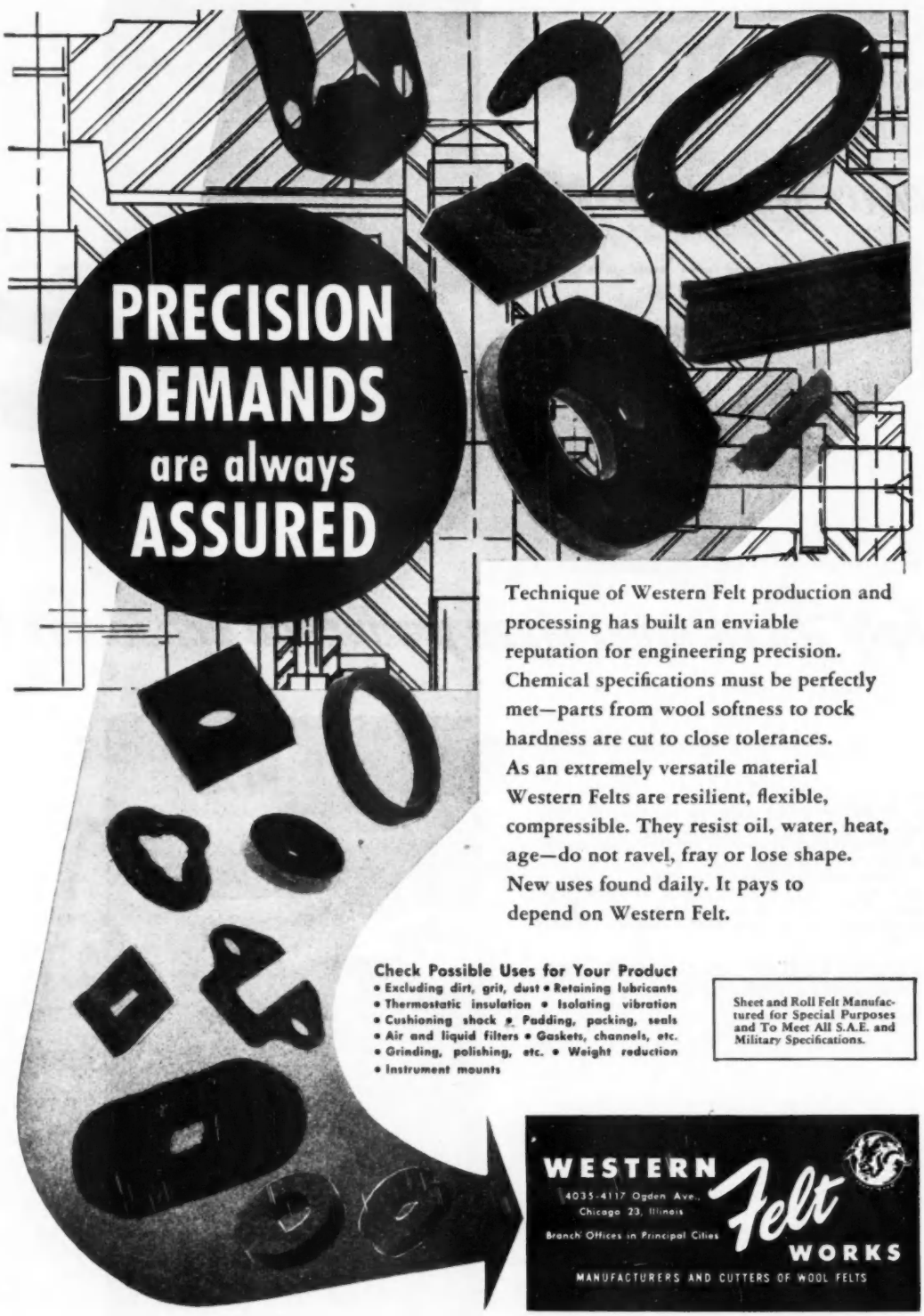
**Indicates complete stock*



View of die shown above mounted in 150 ton press at the Seaman Body Plant of the Nash Kelvinator Corporation in Milwaukee, Wisconsin.

DANLY®

DIE SETS . . . STANDARD OR SPECIAL
DIEMAKERS' SUPPLIES



PRECISION DEMANDS are always ASSURED

Technique of Western Felt production and processing has built an enviable reputation for engineering precision. Chemical specifications must be perfectly met—parts from wool softness to rock hardness are cut to close tolerances. As an extremely versatile material Western Felts are resilient, flexible, compressible. They resist oil, water, heat, age—do not ravel, fray or lose shape. New uses found daily. It pays to depend on Western Felt.

Check Possible Uses for Your Product

- Excluding dirt, grit, dust
- Retaining lubricants
- Thermostatic insulation
- Isolating vibration
- Cushioning shock
- Padding, packing, seals
- Air and liquid filters
- Gaskets, channels, etc.
- Grinding, polishing, etc.
- Weight reduction
- Instrument mounts

Sheet and Roll Felt Manufactured for Special Purposes and To Meet All S.A.E. and Military Specifications.

WESTERN Felt WORKS

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Chicago 23, Illinois

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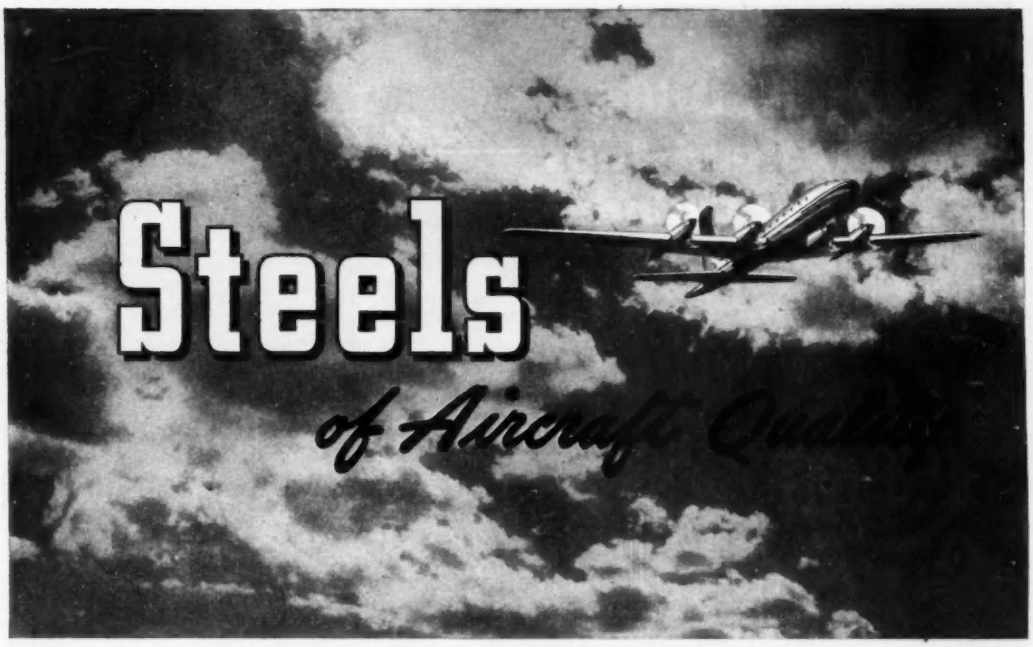
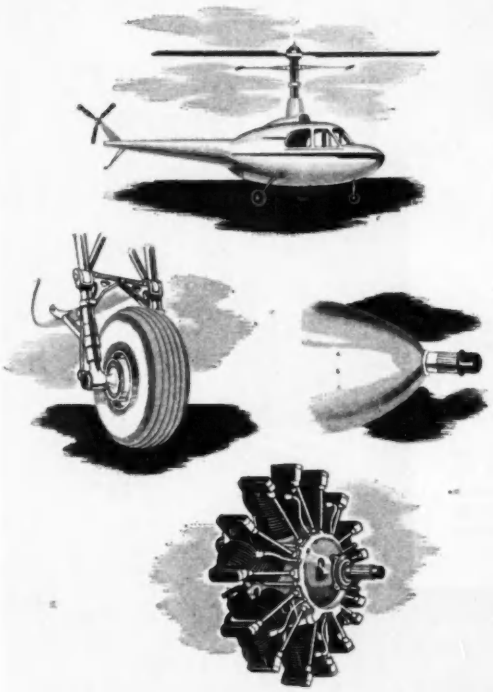
MANUFACTURERS AND CUTTERS OF WOOL FELTS





Highly stressed aircraft parts take steels that require the ultimate in painstaking methods of manufacture and inspection.

Here are some of the steps that Bethlehem takes to produce these highly specialized grades:

- **Careful selection of raw materials**
- **Exacting melting operations**
- **Greater discard**
- **Controlled cooling of billets**
- **Precision heating and rolling**

In addition, at every stage of production, Bethlehem subjects these steels to critical tests, including:

- **Macro-etch testing**
- **Grain-size determination**
- **Hardenability and mechanical testing**
- **Magnetic-particle inspection**

Every heat of steel that Bethlehem classifies as Aircraft Quality is made to top-quality requirements and must satisfactorily pass these inspections.

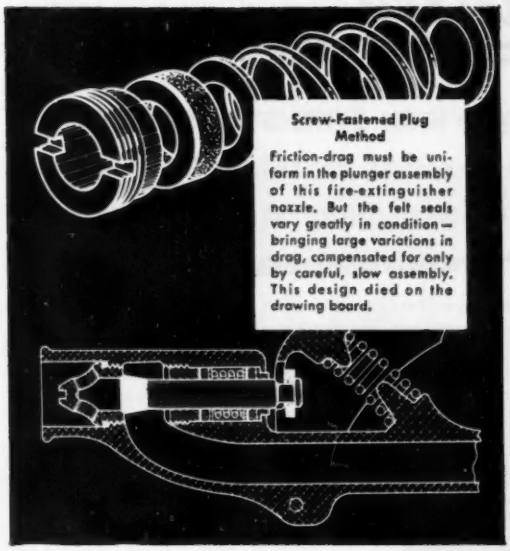
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

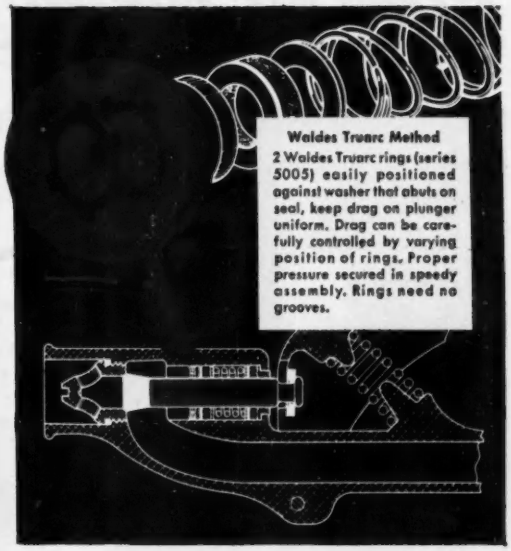
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM ALLOY STEELS

BETHLEHEM STEEL

2 Truarc self-locking rings replace threaded plugs. Save 6¢ per unit, speed assembly by 140%.





Ansul Chemical Company's new watertight precision nozzle for their dry chemical fire extinguisher replaces conventional stainless steel plug with two Waldes Truarc Self-Locking Retaining Rings and washer. Rings hold entire nozzle packing securely in place — keep friction drag of plunger uniform. Adjustable in final assembly, Truarc rings speed production from 25 to 60 units per hour. They save 6¢ per unit in overall costs, 1/8" in length.

Redesign with Waldes Truarc Rings and you, too, will save on assembly, time, improve product performance, facilitate easier servicing of whatever you make.

Wherever you use machined shoulders, bolts, snap rings, cotter pins, there's a Waldes Truarc Retaining Ring designed to do a better job of holding parts together. They're precision-engineered... quick and easy to assemble and disassemble. They give a never-failing grip. Find out what Truarc Rings can do for you. Send your blueprints to Waldes Truarc engineers for individual attention, without obligation.

WALDES TRUARC RINGS MADE THESE SAVINGS POSSIBLE—

Discarded Design		Truarc Design	
Parts:	Cost Per Unit	Parts:	Cost Per Unit
threaded stainless steel plug	$0.0675	2 rings	$0.0146
Direct Labor	$0.0350	1 washer	$0.0280
	$0.1025		$0.0426

Total savings per unit with Truarc Rings $.0599

For precision internal grooving and undercutting... Waldes Truarc Internal Grooving Tool.

SEND FOR NEW CATALOG

WALDES

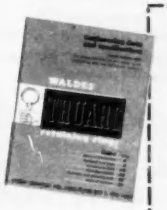
TRUARC

REG U S PAT OFF.

RETAINING RINGS

WALDES KOHINOOR, INC., LONG ISLAND CITY 1, NEW YORK

WALDES TRUARC RETAINING RINGS AND PLIERS ARE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 2,382,947; 2,382,948; 2,416,852; 2,420,921; 2,428,341; 2,439,785; 2,441,846; 2,455,165; 2,483,380; 2,483,383; 2,487,802; 2,487,803; 2,491,306; 2,509,081 AND OTHER PATENTS PENDING.



Waldes Kohinoor, Inc., 47-16 Austel Place, L. I. C. 1, N. Y.

Please send me the new Waldes Truarc Retaining Ring catalog.

(Please print) AY-124

Name.....

Title.....

Company.....

Business Address.....

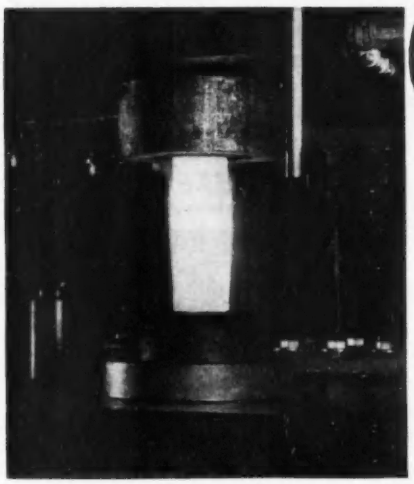
City..... Zone..... State.....

Want More Uniform Results?

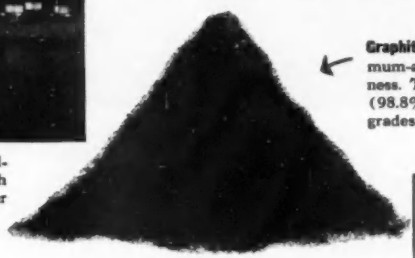
Specify NATIONAL Graphite Products for Powder Metallurgy

PURITY • HIGH STRENGTH • LOW ASH
• HEAT RESISTANCE
• DIMENSIONAL STABILITY

Wherever powders become parts, efficiently and profitably, a lot depends on electric furnace graphite in its various, accurately-controlled grades. Here, for example, are a few applications in which National Carbon's leadership in graphite research may handsomely reward your insistence upon the finest graphites obtainable.



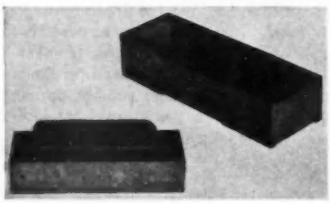
Graphite Molds for Hot Pressing. Available in all required high-strength grades, either as finished molds or as bar stock.



Graphite Powders. Guaranteed minimum-ash grades of specified fineness. Their electrographitic purity (98.8%) is unmatched by natural grades.

GRAPHITE COLLAR FOR WATER-COOLED COPPER CONNECTOR RING

Graphite Spacer Discs. Supplied in diameters up to 30", with accurately-ground parallel faces.



Graphite Sintering Boats. Machined from solid graphite stock to withstand temperatures over 3000 F without distortion. Extra high strength and ultra high purity grades to meet requirements.

Carbon and Graphite Tubes for Resistance Furnaces. Furnished "as extruded" or, where more uniform wall thickness is required, lathe-turned and bored from solid stock.

ENGINEERING ASSISTANCE IN THE APPLICATION OF "NATIONAL" GRAPHITE PRODUCTS IS AVAILABLE THROUGH THE DISTRICT OFFICES LISTED BELOW

DOLLARS and SENSE

. . . point to "Eveready" No. 1050 Industrial Flashlight Batteries . . . the cells that deliver twice as much useable light as any battery we've ever made before. Their unique construction prevents swelling or jamming in the case . . . has no metal can to leak or corrode.

The terms "National" and "Eveready" are registered trade-marks of Union Carbide and Carbon Corporation

NATIONAL CARBON COMPANY
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, New York

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INTERNATIONAL HARVESTER

(SPRINGFIELD OHIO PLANT)

SPEEDS GRINDING OPERATIONS

WITH

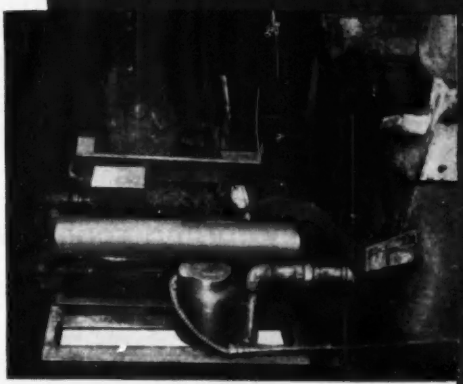
Delpark FILTERS

The DELPARK filter shown at the right supplies clean, swarf-free coolant for the free-cutting wheel of a Blanchard #18 Grinder.

Filtering the coolant removes the cast iron grindings, filters out wheel particles, assures scratch-free parts, grinding accuracy, increased production.

The swarf deposited out is 1½ inches thick on the filter material. In the course of an 8-hour day, 3 yards of filter material are used. The cost is negligible. At the cost of pennies per day, hours are gained, machine efficiency increased, rejection rate reduced and dollars are saved.

There's proof here, as in hundreds of other industrial plants, that DELPARK filters can serve your plant with greater savings and efficiency.



Longer Wheel Life

Uniform Coolant Temperature

Lower Rejections

No Down-time for Desludging Reservoir

Assures a Cleaner, Free-Cutting Wheel

WRITE FOR MORE COMPLETE INFORMATION IN OUR NEW BULLETIN

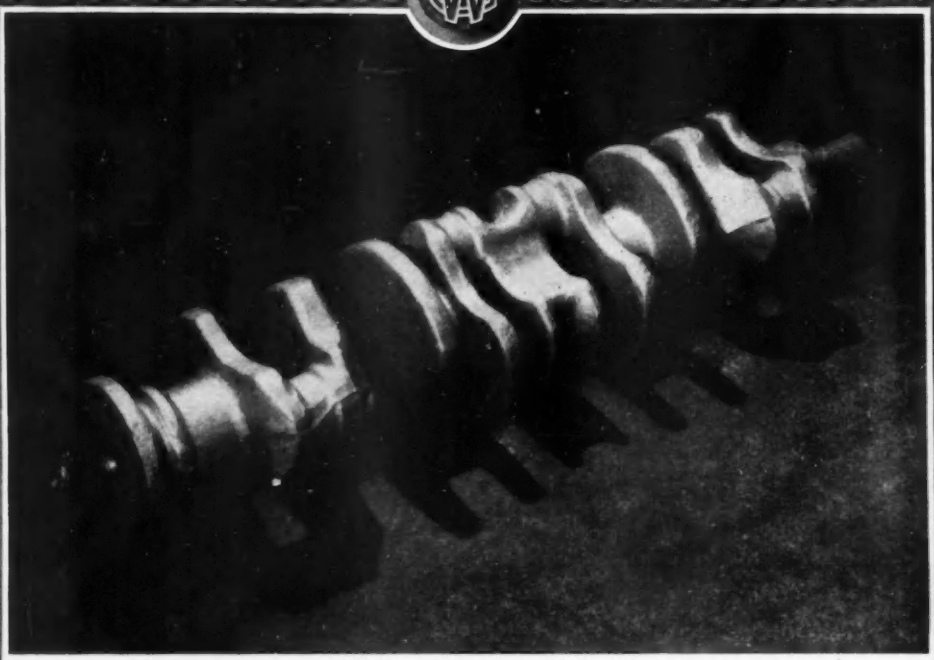
Delpark

INDUSTRIAL FILTRATION

Backed by More Than 30 Years Experience in Industrial Filtration

PATENTS PENDING

INDUSTRIAL FILTRATION COMPANY LEBANON, INDIANA



Fully counterbalanced crankshaft—the ultimate in modern forging technique . . . Wyman-Gordon . . . crankshaft forging specialists since the introduction of the internal combustion engine . . . first to forge crankshafts with integrally forged counterweights . . . . . .

Standard of the Industry for More Than Sixty-five Years

WYMAN-GORDON

FORGINGS OF ALUMINUM • MAGNESIUM • STEEL

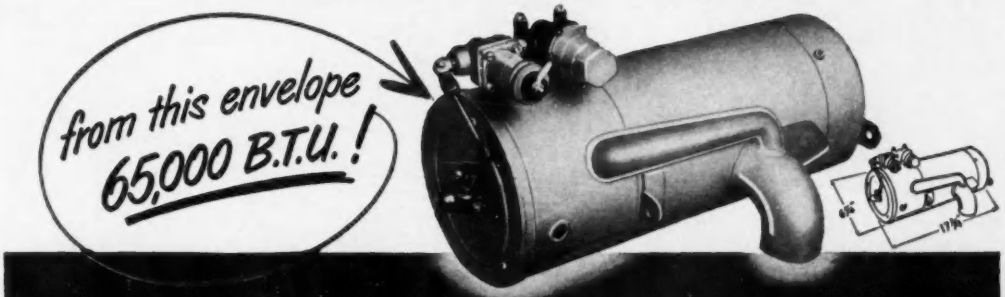
WORCESTER, MASSACHUSETTS

HARVEY, ILLINOIS DETROIT, MICHIGAN

New! Warm Air Pre-Heating for Diesel Engines

Another revolutionary SOUTH WIND first!

Brings the same quick, reliable engine starting enjoyed by major aircraft and military vehicles to any type of diesel engine!



An entirely New application! Works independently of engine heat... engine operation! Makes starting easier, faster at all temperatures

Lower in cost! Smaller in size! Easy to install on practically any diesel model!

Nothing like it now—or ever before! This great new South Wind Pre-Heating advance! Specially designed for diesel applications. Specially engineered to end forever the problem of hard, slow diesel engine starting at any temperature—*even at 65° below!*

A new principle!

Applies clean, non-corrosive, heated dry air *directly* on friction parts *inside* the engine. Perfected by South Wind, this system also heats the lubricating oils. Assures faster, more efficient warm-up of critical parts than any indirect method of transferring heat.

Resistance to cranking power minimized!

The engine is cranked with warm parts and warm lubrication. *Only clean heat* is used to raise the temperature of induction air. This factor assures normal and reliable ignition . . . for quick, sure starting under cold conditions.

Small in size! Light in weight!

Equally effective on either automotive or stationary diesel engines, this new South Wind Pre-Heater burns any required liquid fuel, can be operated automatically or manually. Can be easily, quickly installed on practically any diesel model.

Check these exclusive advantages! Only South Wind offers them all in this new method of Diesel engine pre-heating

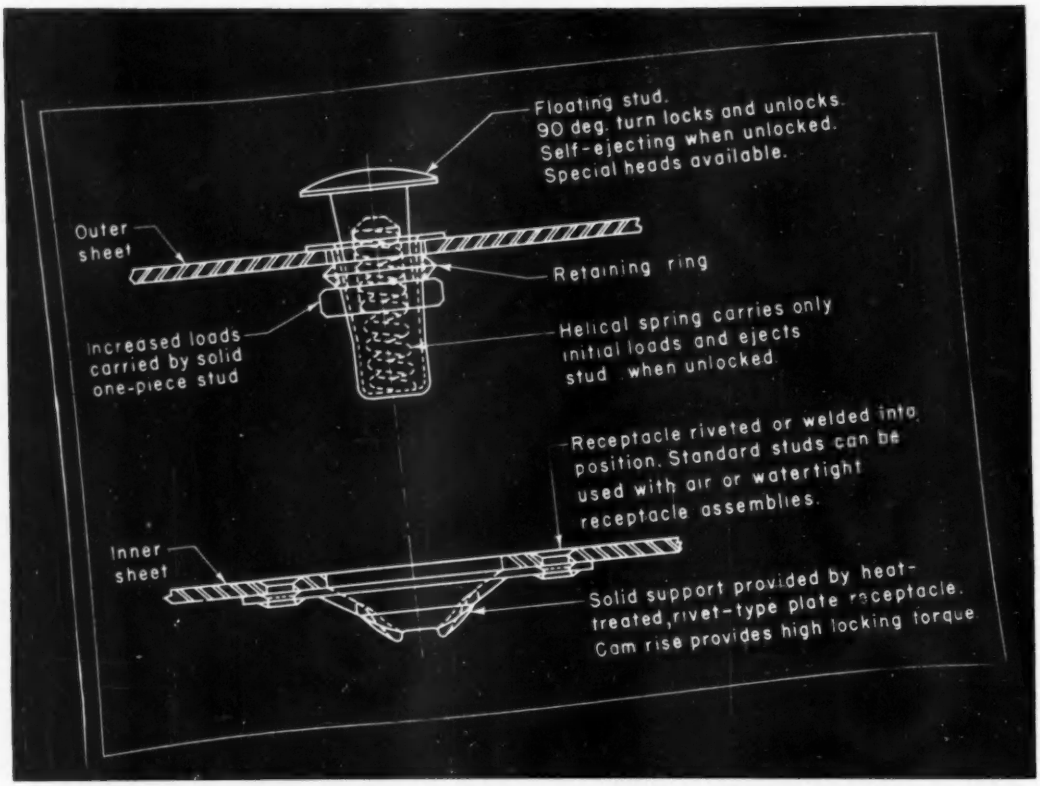
1. **Quick, easier starting at −65°F.**
2. **Conforms to latest military requirements.**
3. **Adequate lubrication at all times.**
4. **Lower maintenance cost.**
5. **Longer engine life.**
6. **No interrupted service.**

Now at your disposal. A staff of experienced South Wind Field Engineers is available to assist you with your specific pre-heating or heating problems. Write today for their help in adapting this or any other model in the complete South Wind line of heaters for commercial, military or civilian use. South Wind Division, Stewart-Warner Corporation, Indianapolis 7, Indiana.

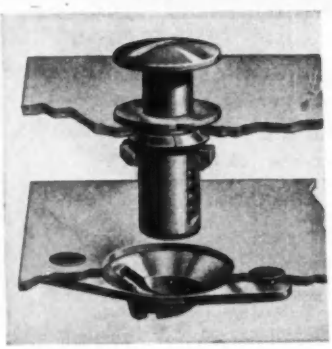
A PRODUCT OF SW STEWART WARNER

South Wind

AIRCRAFT HEATING AND THERMAL ANTI-ICING EQUIPMENT INERT GAS GENERATORS



HOW QUICK-LOCK CUTS FASTENING COSTS



A glance at the drawing shows the advantages of QUICK-LOCK's efficient design. QUICK-LOCK speeds up the mounting and demounting of detachable panels, works equally well on curved or straight sheets.

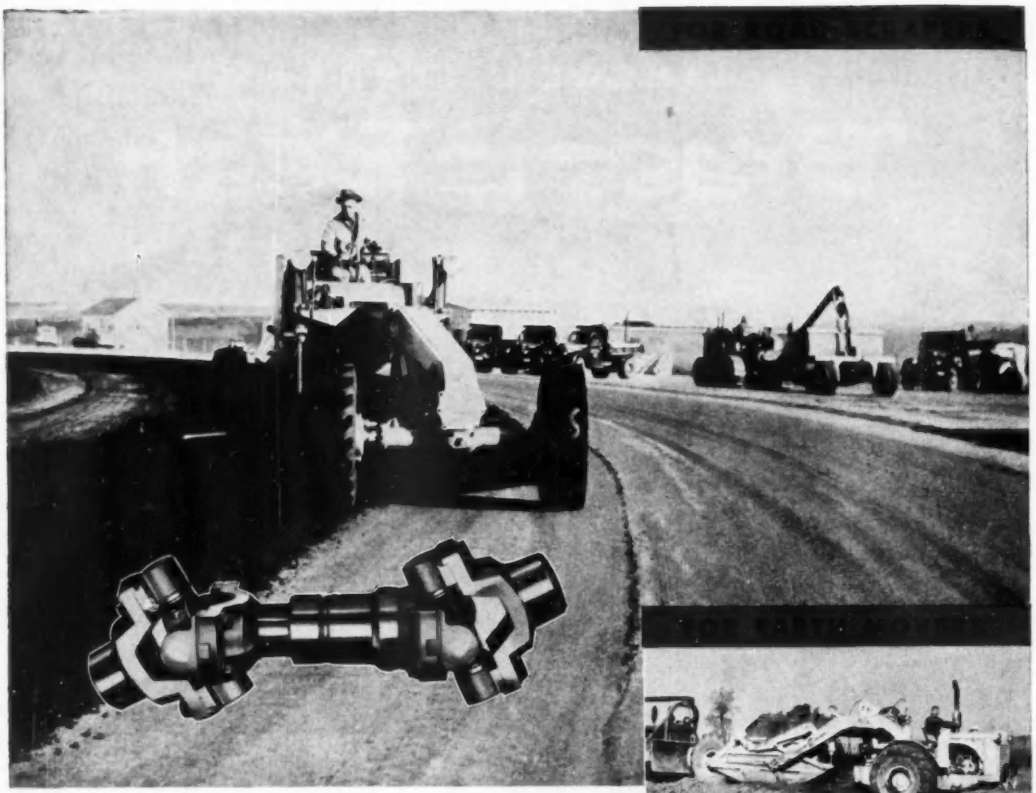
QUICK-LOCK is adaptable to many different fastening applications in the aircraft, automotive, railroad, electrical and appliance fields. Let Simmons engineers help you cut assembly costs. Write for literature and samples today.

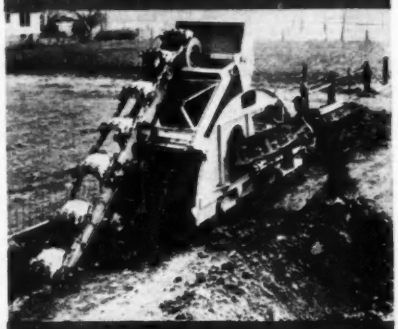
SIMMONS FASTENER CORPORATION · 1749 No. Broadway, Albany 1, New York

Simmons

QUICK-LOCK
SPRING-LOCK
ROTO-LOCK
LINK-LOCK

FASTENERS THAT IMPROVE PRODUCTS AND REDUCE ASSEMBLY COSTS





MECHANICS JOINTS

Are Used on the TOUGH JOBS

Designers with JOINT problems have learned to rely on MECHANICS. Where joints must run all day at constant angles up to 45°—where there are severe shock loads—where wide angles and long slip are common—and where dirt and/or moisture are continually present—MECHANICS Roller Bearing UNIVERSAL JOINTS are the accepted solution. Lubrication is so tightly sealed in that dirt and moisture cannot enter. If you have a "tough" joint problem, make use of MECHANICS engineers' wide experience.

MECHANICS
UNIVERSAL JOINT
DIVISION
Borg-Warner
2024 Harrison Ave.
Rockford, Ill.

MECHANICS
Roller Bearing BW
UNIVERSAL JOINTS
For Cars • Trucks • Tractors • Farm Implements • Road Machinery • Aircraft • Tanks • Busses and Industrial Equipment

for **BOTH** voltages...

12

MASTER MOTOR TESTER

VOLTS AMPERE TESTER

BATTERY STARTER TESTER

POWER TIMING LIGHT

BATTERY CHARGER UNIT

SUN makes it easier for you

to service the cars of today... *and tomorrow*

...with test equipment in advance of the times

Anticipating new and revolutionary innovations in the automotive industry has been a major factor in making SUN—the world's largest manufacturer of automotive engine and electrical system test equipment.

Available NOW... is the newly engineered SUN Master Motor Tester and Accessory Group for completely and accurately testing *both* 6 and 12 volt automotive engines. Each of these new units has been designed to make every test on 6 and 12 volt systems in compliance with the car manufacturer's approved methods. It is now possible, with this new SUN Equipment, to modernize *your* testing department today—in the sure knowledge that these new units will not only service the cars and trucks of the present—but those of tomorrow as well.

To help you modernize... SUN has developed a Modernization Plan that tells you how easily you can convert *your* present test equipment—to the new 6-12 volt units... how your old 6 volt testers can be used as a valuable trade-in. Prepare for tomorrow—today! Talk to your nearest SUN Representative—or write directly to us for complete information on the Modernization Plan.

SUN Equipment is also available for fleet and military use—in 6-12-24 volt units.

ELECTRIC CORPORATION 6373 AVONDALE AVENUE CHICAGO 31, ILLINOIS

SUN Technical Training Schools in 15 cities. Night and Day Courses.

Friction material problem?

R/M BELONGS IN YOUR PICTURE!

"STOP-AND-GO" IS OUR BUSINESS!

Passenger car manufacturers have long brought their brake and clutch problems to RAYBESTOS-MANHATTAN. They *know* they can count on R/M for brake linings, clutch facings, and automotive transmission friction parts for all cars of current or future design.

R/M leadership in the automotive industry is as old as the industry itself. More cars, trucks and buses use R/M friction materials than any other make.

And R/M leadership in these products takes in many other fields, from machine tools to farming equipment.

This wide variety of applications means that R/M experience can help *you* in practically any STOP-AND-GO problem. Call in your R/M representative. He can work from samples, from designs on paper, or from figures on horsepower development combined with desired performance characteristics. Behind him stand the facilities of the world's largest producers of friction materials, with six great plants . . . their research departments, and their testing laboratories.

The opening of our new Wabash Division, Crawfordsville, Ind., provides expanded facilities for the manufacture of
SINTERED METAL FRICTION MATERIALS

R/M
FIRST IN FRICTION

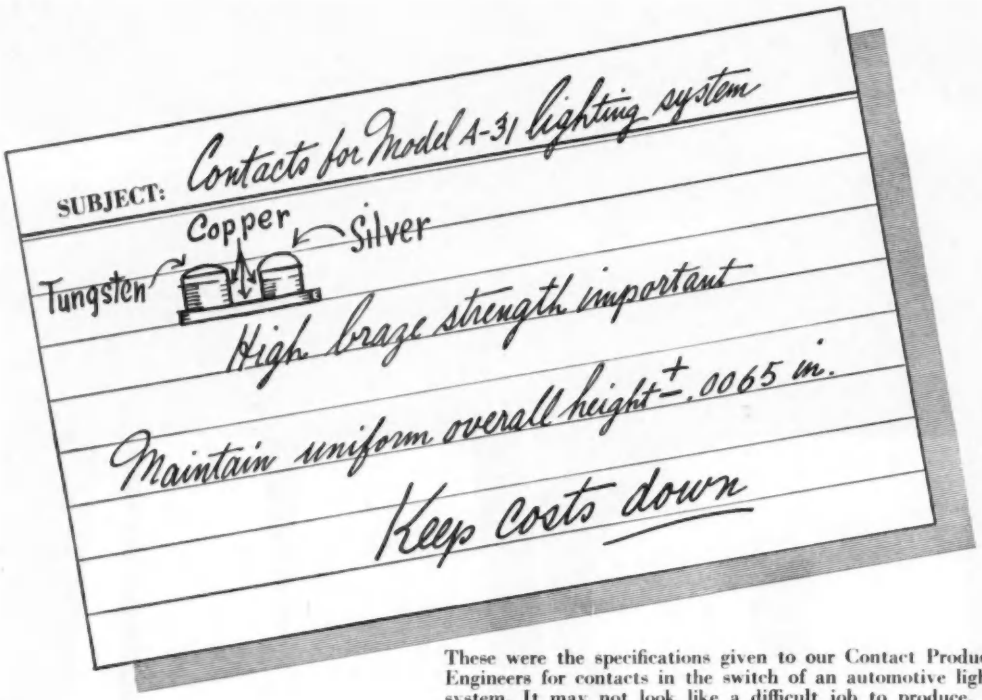
RAYBESTOS-MANHATTAN, INC.

EQUIPMENT SALES DIVISION 445 Lake Shore Drive, Chicago 11, Ill.
Detroit 2 Cleveland 14 Los Angeles 11

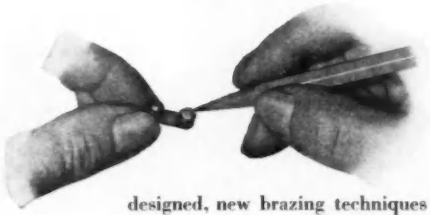
Factories: **Bridgeport, Conn. Manheim, Pa. Passaic, N.J. No. Charleston, S.C. Crawfordsville, Ind. Canadian Raybestos Co. Ltd., Peterborough, Ont.**

RAYBESTOS-MANHATTAN, INC., Manufacturers of Brake Linings • Brake Blocks • Clutch Facings Fan Belts • Radiator Hose • Industrial Rubber Products • Rubber Covered Equipment • Mechanical Packings • Asbestos Textiles • Sintered Metal Products • Abrasive and Diamond Wheels • Bowling Balls


R/M



These were the specifications given to our Contact Production Engineers for contacts in the switch of an automotive lighting system. It may not look like a difficult job to produce. But, tungsten is hard and brittle and must be carefully ground to shape. Silver is soft and ductile . . . difficult to machine without "tearing". Brazing materials for silver and tungsten are not the same.



These were just a few of the problems involved in this particular job that were solved by Mallory production techniques. For example: new tungsten grinding equipment was designed, new brazing techniques were developed and the silver contact point was fabricated without machining. As a result, dimensions were held to the specified accuracy . . . the required high braze strength was achieved . . . the entire job was mass produced, uniformly and at low cost.

This is another example of how Mallory contact design and production experience, backed by specialized plant facilities, worked out the answer to a specific problem. Regardless of the requirements of your electrical contacts, Mallory can produce them to the highest quality standards . . . at the right price.

Expect more . . .
Get more
from MALLORY

In Canada, made and sold by Johnson, Matthey and Mallory, Ltd., 110 Industry Street, Toronto 15, Ontario.

Electrical Contacts and Contact Assemblies

P.R. MALLORY & CO. Inc.
MALLORY

SERVING INDUSTRY WITH THESE PRODUCTS:
Electromechanical—Resistors • Switches • Television Tuners • Vibrators
Electrochemical—Capacitors • Rectifiers • Mercury Dry Batteries
Metallurgical—Contacts • Special Metals and Ceramics • Welding Materials

P. R. MALLORY & CO., INC., INDIANAPOLIS 6, INDIANA

HESS HAULS
bulk cement and depends on
SKF

Here's an unusual trailer—operated by Hess Cartage Company of Melvindale, Michigan.

Mr. Carl Hess designed it to haul bulk cement. Each unit incorporates a screw and air combination conveyor for automatic unloading.

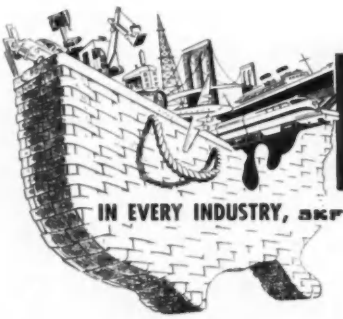
The Hess fleet operation is a big one—255 tractors, and 525 trailers. It covers 10 million miles a year in five states, has average payloads of 45,000 to 60,000 pounds, mostly cement and structural bar, sheet and structural steel.

In their 35 years of service to its customers, Hess Cartage has learned—as so many fleet operators have learned—that careful maintenance pays off. Part of this maintenance is in the form of SKF Bearings—always sure to deliver rugged endurance and dependability.

Operators of heavy on- and off-the-road automotive equipment know SKF Bearings well. They depend on SKF Single Row Deep Groove Bearings for their ability to carry combination radial and thrust loads at high speed, for their shields and seals which retain lubricant and exclude dirt. They depend on SKF Cylindrical Roller Bearings for extremely high radial capacity and low friction. And for propeller shaft boxes on heavy-duty equipment, maintenance men specify SKF Self-Aligning Ball Bearings.

Everyone, from equipment designer to equipment operator, depends on SKF engineering for advanced equipment and dependable performance.

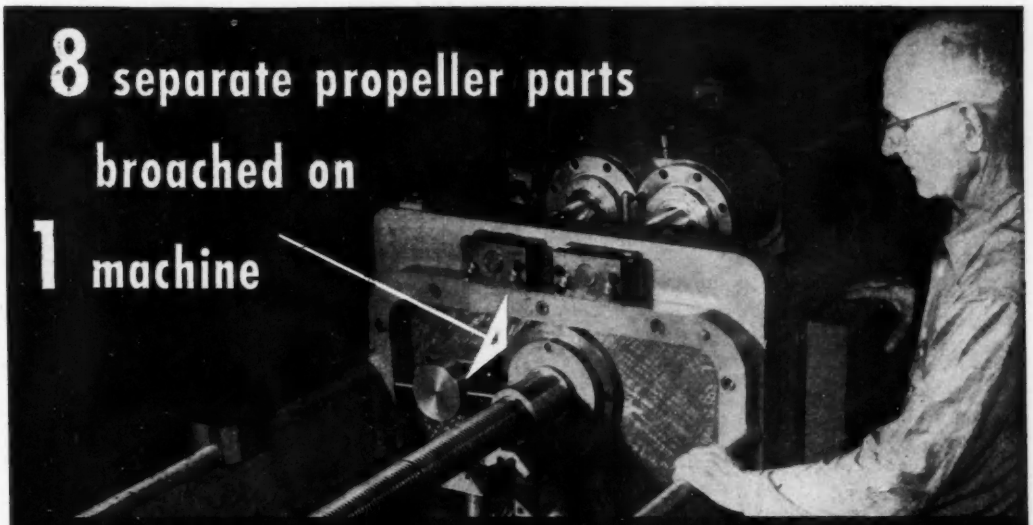
SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.—*manufacturers of* **SKF** *and* HESS-BRIGHT *bearings.* 7368



SKF®
BALL AND ROLLER BEARINGS

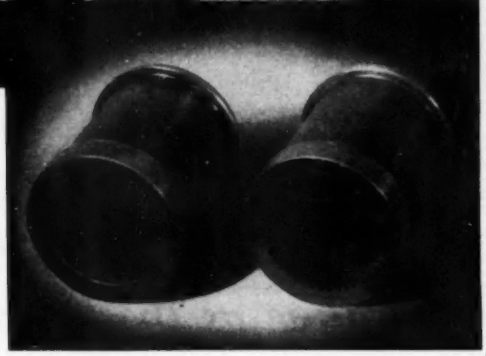
IN EVERY INDUSTRY, SKF Puts The Right Bearing In The Right Place

8 separate propeller parts broached on 1 machine



A PROPELLER MANUFACTURER GOT THESE BENEFITS FROM HIS AMERICAN HORIZONTAL MACHINE:

1. **Tooling is readily inter-changeable for eight separate parts of short run production.**
2. **Large parts are easily loaded and unloaded.**
3. **Double helical drive for right and left hand helix readily adaptable to machine.**
4. **The horizontal machine provided the most tonnage and stroke per dollar invested.**

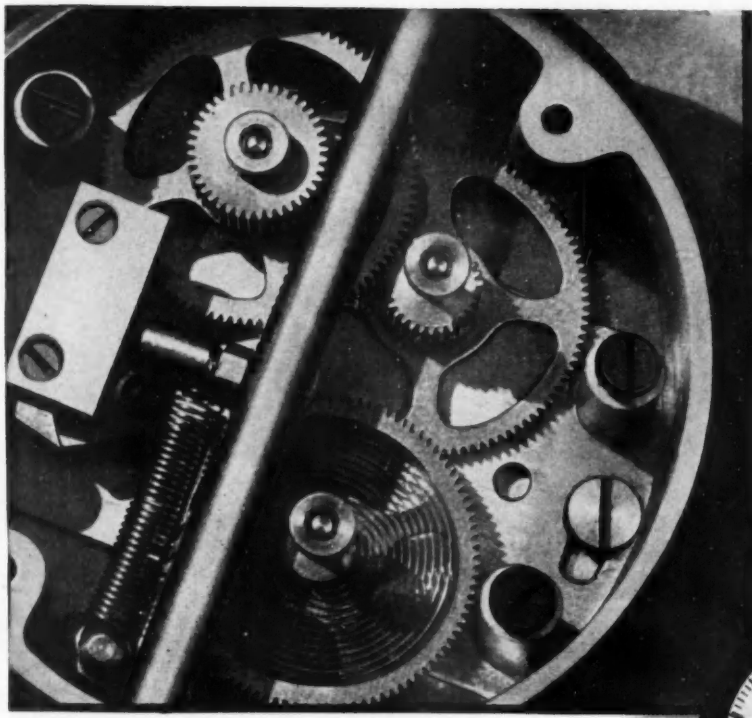


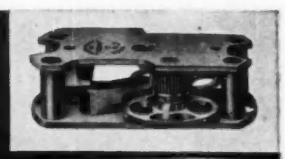
To broach the propeller sleeve gears, American built and equipped a standard HDE-30-72 horizontal broaching machine with six interchangeable lead bars for different internal spline operations. The machine broaches eight different propeller sleeve gears. Number of spline teeth vary from 43 to 55 with diameters ranging from 2¾" to 3½", and with length of splines cut ranging from ¾" to 3" long. Ask American which type of machine best suits your requirements. Just send a part print and hourly requirements for our recommendations.

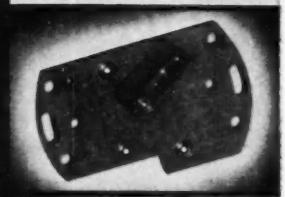
AMERICAN *American* BROACH & MACHINE CO.
A DIVISION OF SUNDSTRAND MACHINE TOOL CO.
ANN ARBOR, MICHIGAN

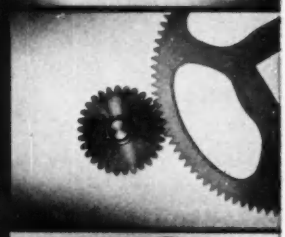
SUNDSTRAND

See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery









The Dial Indicator Built as Fine as the Finest Watch

Today the Dial Indicator is built mechanically as fine as the finest watch, for years the standard of comparison for fine manufactured articles.

The distance the contact point of a Dial Indicator moves must be accurately magnified by its rack and gears so that the amount of this distance will be accurately indicated by the dial graduations.

Gear teeth must be so designed and precisely cut they will magnify the movement of the contact point accurately and positively. All bearings and bushings must fit precisely so there is no lost motion and yet they cannot fit so tightly as to cause excessive friction. Inertia must be held to a minimum. All these details are necessary if a Dial Indicator is to be sensitive to slight dimensional variations.

A Dial Indicator must have exceptional fidelity in order to always "repeat" the same reading for the same amount of variation.

And, finally, a Dial Indicator must have the stamina and durability to withstand sudden shock and rough abuse.

At Federal Products Corporation we are constantly aware of the importance of these requirements. Federal leads in the development of Low-Friction, Low-Inertia, Full-Jeweled Indicators. Federal's top and bottom movement plate construction has long defied improvement and Indicator maintenance men prefer it to all others.

Send for Federal's latest catalog showing the most complete line of Dial Indicators and Indicating Gages. FEDERAL PRODUCTS CORPORATION, 2612 Eddy Street, Providence 1, Rhode Island.

ABOVE ILLUSTRATIONS
(Top to Bottom)

Note rigid assembly of top and bottom plates and massive support for pinion bearing — features which mean long lived accuracy.

•

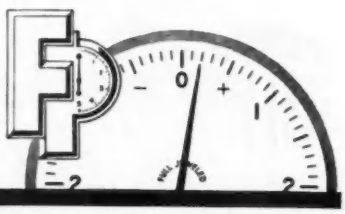
Bottom plate of heavy gage brass showing jeweled bearings and precision workmanship.

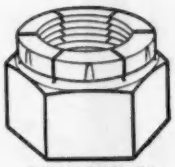
•

Teeth of gears and pinions are cleanly cut — not stamped — and they mesh accurately.

FEDERAL

Largest manufacturer devoted exclusively to designing and manufacturing *all types* of DIMENSIONAL INDICATING GAGES





FLEXLOC Self-Locking Nut

"What are Flexloc locknuts?"

"They're nuts that hold assemblies together, and they just won't work loose like ordinary nuts."

Nuts that loosen are headaches, or even worse, because they may necessitate shutting machines down. When that happens, production flops, assembly lines stop, and delivery promises are not kept. FLEXLOC locknuts offer a simple solution to such problems—they don't work loose. And though they stay put, they can easily be removed with a wrench when necessary.

Standard FLEXLOC Self-Locking Nuts have a higher tensile value than most other locknuts. They're not affected by temperatures up to 550°F. Their torque is controlled within such narrow limits that they have been used successfully on plastic studs. FLEXLOC locknuts are stop nuts, too. They lock when you stop turning them—they don't have to be seated.

Increased capacity now enables us to make quantity shipments of FLEXLOC locknuts in a wide range of sizes. Write for literature and samples. STANDARD PRESSED STEEL CO., Jenkintown 53, Pa.

FLEXLOC LOCKNUT DIVISION

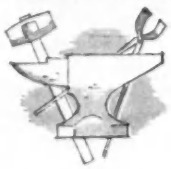
sps

JENKINTOWN, PENNSYLVANIA

A SALUTE TO

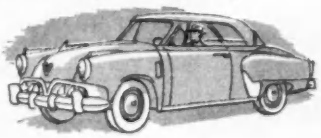
Studebaker

on its 100th anniversary



On February 16, 1852, two Studebaker brothers—Henry and Clem—opened a blacksmith shop in South Bend, Indiana. They had only $68 worth of capital and two sets of blacksmith tools between them. Gross sales that first day totaled 25 cents. One hundred years later the working capital of the Studebaker Corporation stands at $65,000,000 and sales are in excess of $500,000,000 a year. That is free enterprise! It is also vision . . . the vision of the Studebaker brothers to foresee the importance of building a reputation. Studebaker has always taken a genuine pride in giving the customer a vehicle he could boast about . . . in building extra quality . . . in employing not just workers but craftsmen.

We are proud of long-time association with the Studebaker organization . . . an organization with a heritage of quality.



*REG. U.S. PAT. OFF.

Eclipse Machine

DIVISION OF Bendix AVIATION CORPORATION

ELMIRA, NEW YORK

Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, N.Y.

Bendix* Folo-Thru Starter Drive  Bendix* Automotive Electric Fuel Pump  Stromberg* Aeroquad Carburetor 

AUTOMOTIVE INDUSTRIES

Editorial and Business Executive Offices
Chestnut and 56th Sts., Philadelphia 39, Pa.
Cable Address Autoland, Philadelphia

High Spots of This Issue

★ **Special Report on Air Conditioning and Refrigeration**

The importance of cooling in its various forms as an aid to more advanced manufacturing processes has struck the automotive and aviation industries with great force. Presented here is a survey of techniques and applications in plants. Page 52.

★ **British Makers Introduce New Models at London Show**

Following close on the heels of the recent Motor Transport Exhibition, Britain's Thirty-seventh Automobile Show also produced some interesting developments. Highlighted in this report are new models and equipment unveiled for the first time. Page 62.

★ **Dodge Solves Tooling for New V-8 Overhead Valve Engine**

Engineering ingenuity was really put to the test to get the first Red Ram engine line underway, for Dodge had to build some of their own machine tools. Accomplishments on this score, and operation of the line are herein described. See Page 66.

★ **Automotive Advancements in Plastics**

Evidence of the increasing interest of automotive manufacturers in the functional uses of plastics was apparent at the recent meeting of the American Society of Body Engineers. Important points of the technical papers and exhibits are covered. Page 70.

★ **Impacting—A New Forging Method**

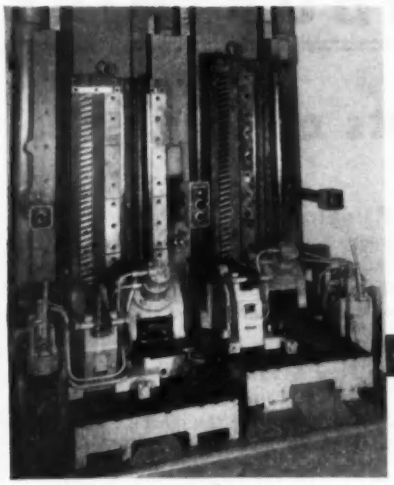
Described in this article is a new technique for making drop forgings automatically by using Chambersburg Engineering Co.'s Impacter machine. The text and accompanying illustrations analyze completely the operation of this rather unique unit. See Page 90.

★ **29 New Product Items And Other High Spots, Such As:**

Stainless steel aircraft nacelles present many production problems; Packard-designed power steering; 1953 Lincoln improvements; plastic foam replaces ribs in airplane control surfaces; NoSpin overrunning clutch; and truck trailers bridge gap in airplane assembly line.

Automotive and Aviation News, Page 33
Complete Table of Contents, Page 3

. . . with a single objective **Low Cost!**

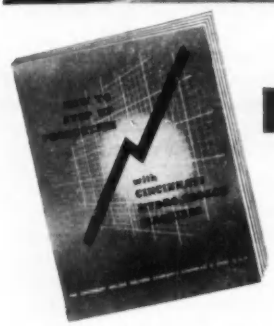


Three types of setups, engineered by Cincinnati on CINCINNATI Duplex Vertical Hydro-Broach Machines, all achieve a common objective . . . low-cost production of connecting rod caps. Many examples of other types of setups will be found in our folder, "How to Step Up Production with Cincinnati Hydro-Broach Machines," M-1599-1. It's yours for the asking. And if you would like to have complete information on CINCINNATI Single Ram and Duplex Vertical Hydro-Broach Machines, ask for catalogs M-1745 and M-1709-1. Brief data in Sweet's Catalog File for Mechanical Industries.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

TWO OPERATIONS ON TWO PARTS EACH MACHINE CYCLE

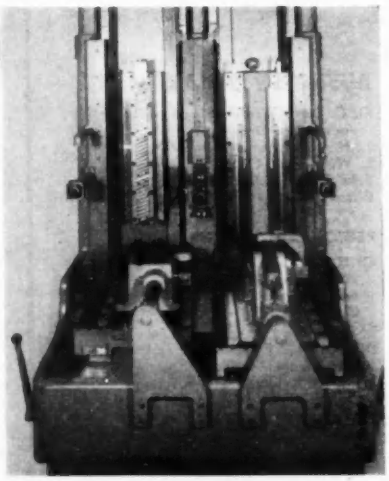
Part Name	Main bearing cap block
Material	Cast iron
Operation	Broach top of rear cap in left-hand station of each fixture, and oil grooves and transfer slots in right-hand station of each fixture
Stock Removal	⅛"
Production	210 per hour, complete
Equipment	CINCINNATI No. 10-66 Vertical Duplex Hydro-Broach Machine with complete tooling

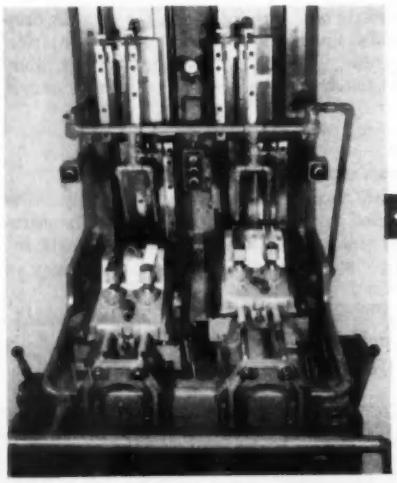


Write for this informative folder, publication No. M-1599-1.

PROGRESSIVE BROACHING

Part Name	Main bearing cap block
Material	Cast iron
Operation	Broach pad in left-hand fixture Broach two angular grooves in right-hand fixture
Stock Removal	⅛"
Production	150 per hour, complete
Equipment	CINCINNATI No. 10-54 Duplex Vertical Hydro-Broach Machine with complete tooling





FOUR PARTS EACH MACHINE CYCLE

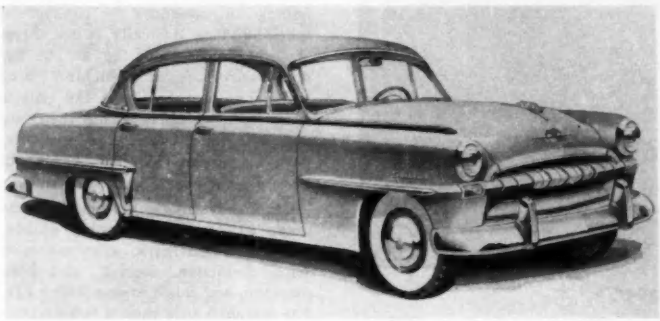
Part Name	Connecting rod cap
Material	Cast iron
Operation	Broach sides (two parts in each fixture)
Stock Removal	3/32"
Production	615 per hour
Equipment	CINCINNATI No. 5-42 Duplex Vertical Hydro-Broach Machine with complete tooling

CINCINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 107, No. 11 **December 1, 1952**



THE NEW PLYMOUTH

The 1953 Plymouth follows the Chrysler styling trend. Single wheelbase is 114 in. Front seat on two-door models is divided off-center. Front and rear suspensions are changed, with new non-parallel control arms in front and wider rear springs hung inboard of the frame rails. Other changes include a new radiator core and shrouded fan, headlight switch with built-in circuit breakers, wider and shallower frame rails.

Three Hold Price Line on '53 Models

DeSoto Div. of Chrysler Corp. has followed the lead set by Dodge and Chrysler Divs. by reducing prices on some of its 1953 models slightly and also making very slight increases in others. It also has reduced prices on 11 of 18 optional equipment items. Reductions were made on four V-8 models varying from $1.02 to $10.86 with two others down only a few cents. Price comparison on six cylinder models between 1952 and 1953 lines are difficult because of changes in standard and optional equipment, but the increases indicated range from about $20 to $31.

Plymouth Div. has carried out the theme in car pricing on 1953 models by reducing prices of its four higher priced lines and leaving others substantially as they were in 1952. The reductions range from $38 to $78 and apply to convertibles and station wagons.

Packard Motor Car Co. is holding the line price-wise on its 1953 models. The company announces that the Clipper line will start at $2534 for the club sedan and that the Packard series starts at $3234. Top price for a standard production Packard is $3735 for the Patrician. This represents a $50-$62 cut on two models, although one sedan is increased $116.

Chrysler Increases Net Despite Lower Sales

Chrysler Corp. showed an increase of $9.5 million in net earnings for the first three quarters of this year despite lower sales, higher taxes, and increased costs. The company reports net earnings at $59,611,657 for the nine months, compared with $50,108,179 in the same period a year ago. Sales during the first nine months of this year totaled $1.72 billion, of which more than $203 million, or roughly about 11 per cent, was accounted for by defense products. During the period Chrysler spent a little more than $41 million for additions to land, buildings, machinery, and equipment.

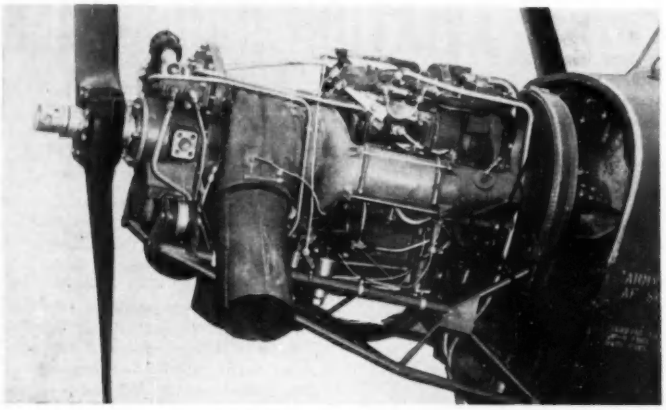
Trustee Hints Tucker May Be Reorganized

An interesting report from Chicago says that there is a possibility of reorganizing the defunct Tucker Corp. around Air-cooled Motors, Inc. of Syracuse, N. Y. The report comes from John Chatz, trustee of the bankrupt company.

STYLED BY DARRIN

First showing of this experimental sports car was held recently in Los Angeles. The convertible is one of several being built for Kaiser-Frazer Corp. by Howard Darrin. Made of Fibreglas, the body is mounted on a Henry J chassis. It features sliding doors and disappearing top.

News of the AUTOMOTIVE



LIGHT TURBOPROP

The Cessna XL-19B recently passed initial flight tests. Powered with the Boeing 502-8 gas turbine, the XL-19B weighs 125 lb less than the piston engine version. The engine weighs 250 lb, is rated at 210 hp on takeoff and 175 hp cruise. Project is sponsored by Cessna, Boeing, the Army, and the Air Force.

New Bendix Division Created in Michigan

Establishment of a new manufacturing division of Bendix Aviation Corp. at St. Joseph, Mich., was announced recently by Malcolm P. Ferguson, president. The new operation, to be known as the Lakeshore Div. of Bendix, will manufacture a line of the corporation's commercial hydraulic products in the automotive, agricultural and transportation fields. The foundry section of the new plant, which has been purchased from the Nylon Products Co. will add several Bendix items to its present line of castings production.

Bendix operations at the St. Joseph plant, a modern tile and glass block structure of 160,000 square feet, are scheduled to begin in December.

Army Shows BARC

A demonstration of the Army's new 60-ton amphibious resupply vehicle, the BARC, was held last week at Seattle, Wash. Made by Pacific Car & Foundry Co. at Renton, the BARC is designed to take tanks, cranes, small locomotives, or artillery pieces from ships offshore and deliver them to supply points well inland.

The vehicle is 61 ft long, 27½ ft wide, and 16 ft high; tare weight with fuel is 197,000 lb and maximum emergency load is 100 tons. A land speed of 15 mph and a water speed of 7.3 mph can be reached when empty. Four 165-hp Diesel engines drive the vehicle. Each of the four tires weighs 3000 lb and is 9½ ft in diameter.

Federal-Fawick Testing Three-Shoe Truck Brake

Federal-Fawick Corp. has developed a new type truck brake which currently is being tested by Army Ordnance, and which the company is hoping to introduce to commercial truck builders. Basically, it is a three-shoe brake operated by air or hydraulic pressure, or a combination of both. The company says the unit is completely contained within the drum and eliminates need for air diaphragms, brake chambers, shock adjusters, cam shafts and push rods.

Other advantages claimed for the brake are greater stopping ability, lower heat generation, elimination of drum distortion, scoring, and heat checking, and much longer lining life. The company says that in volume production the brake would be priced competitively with systems now in use. Another advantage cited is ease of servicing, since the entire unit may be disassembled by removing three snap rings and three pins. The brake also can be installed on most existing standard trucks without modification of axles and drums and plans are under way to test it in several truck fleets. Original objective, however, is to obtain adoption of the unit by truck builders as standard equipment.

Harlow Curtice Will Replace Wilson as President of General Motors

With the announcement of his appointment as Secretary of Defense, C. E. Wilson, president of General Motors Corp., named Harlow H. Curtice to be acting president pending approval by the board of directors today. Curtice, 59, was executive vice-president.

Born in Eaton Rapids, Mich., Curtice began his career as a bookkeeper at AC Spark Plug Div. and at the age of 21 became comptroller, being the youngest executive in the automobile industry. He rose to assistant general manager and in 1929 at the age of 35 he became president of AC. Transferred to Buick Motor Div. in 1933, he is credited with doubling its output the following year. During World War II he headed Buick war production, and supervised reconversion in 1945.

He became corporation executive vice-president in 1948, and was elected a member of the board of directors and the committees on financial policy, operations, and administration.

Curtice is active in the AMA, the Department of Commerce, the Committee for Economic Development, and the Advertising Council. He is a director of the United Foundation and the Economic Club of Detroit. He is a member of several clubs in Detroit, and is chairman of a bank in Flint, Mich., his home.

AND AVIATION INDUSTRIES

Industry Believes Steel Will Be Adequate Next Year

There is little doubt among automotive industry leaders that steel capacity next year will be entirely adequate to meet defense needs under the extended military program and at the same time have plenty left over for a large civilian output.

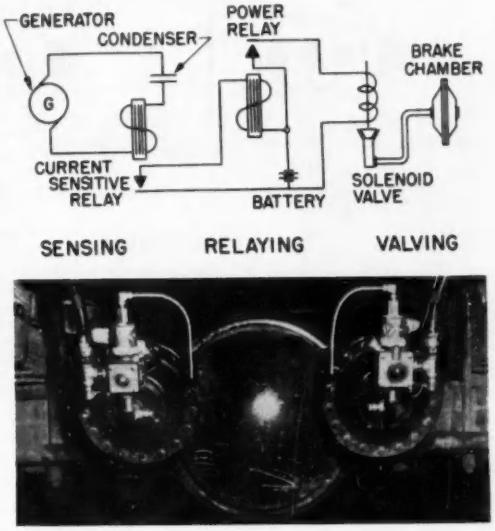
Even though neither car nor truck production will make any kind of record this year, the industry's performance still must be considered extremely good in view of the many obstacles experienced all year. It now looks as though 1952 will wind up with about 4.3 million cars and 1.2 million trucks for the fourth best year on record. Canadian production should set a new record, however, despite past shutdowns.

The most common opinion now is that controls will be removed by the end of the first quarter of 1953. Prior to that time, however, Government allocations probably will hold vehicle production under what would be possible in a free economy.

The steel allotment has been increased by 337,000 tons and now industry officials are confident that a further boost will be made so that they can build at least 1.25 million cars in the first quarter. They would like to increase that figure to 1.5 million, but at this point it seems unlikely that NPA would set the quota that high.

Cost Conscious

Tightening credit may affect the sales picture in future months. Declaring that too many with Crosley purses have Cadillac appetites, the American Finance Conference at its Chicago convention last month resolved that a minimum one-third down would be required from new car purchasers, with 24 months to pay the balance. Prices have so far been held on new models to present figures, which fact the public probably understands better than it does the operating costs of a new car—eight cents per mile and up, according to data presented at University of California's Institute of Traffic and Transportation Engineering. Competition from abroad may stiffen in the light car field, where this figure is an important selling point. The first shipment of new cars from Germany to Canada in 13 years was unloaded late last month. Volkswagon cars, light trucks and buses will be coming in regularly from now on. In Mexico, a British automobile executive visiting Hillman and Austin assembly plants there indicated it might be possible to sell British cars at lower prices next year.



NOSKID

Airplane - type brake control was applied to a truck to prevent skidding. Goodyear Aircraft Corp mounted a d-c generator on rear wheel to sense premature wheel slowdown, and to energize relays which close valve in the brake line. Valves are shown mounted on brake chambers.

Mercury Engines Will Be Made at Ford Cleveland Plant

As soon as tooling is completed, the Mercury overhead-valve engine will go into production at the Ford Motor Co.'s Cleveland engine plant. During a press tour of the company's new foundry there late last month, it was revealed that the program was scheduled to start production by July, 1953. Ultimate goal is 4600 engines per day for the plant, including both Ford sixes and Mercury eights.

The new Ford foundry, with a capacity of 1400 tons of hot metal daily, is in practically full operation except for certain items of equipment for V-8 molding lines, and has been producing blocks, heads, flywheel housings, and small parts for the six-cyl engine for some time. Shell-molded crankshafts, however, are produced at Dearborn and will continue there.

Most 1953 Cars Adopt New Type Carpeting

Practically all 1953 new car lines will have a new type carpeting consisting of a fabric pile on a foam rubber backing pad. The new carpeting, called Candalon, is produced by Collins & Aikman Corp. under a new process which involves applying the liquid foam rubber composition directly to the fabric in the form of a thick cream which solidifies to form an integral unit consisting of the backing and the fabric pile. The process not only does away with adhesion problems but also saves cost by eliminating heavy backing threads. The company says that water will not penetrate the rug and that dirt and dust do not infiltrate, making it easier to clean. Another advantage is the insulation against noise and vibration afforded by the foam rubber backing.

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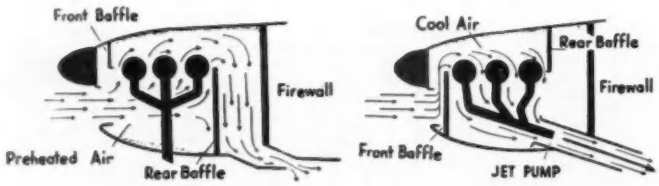


JET COOLED

A new exhaust augmented jet cooler is available for personal planes. Fletcher Aviation Corp. is demonstrating its cooling kit on a Navion powered with the new Continental 225 hp engine. The kit is said to reduce cylinder head temperature up to 100 F at any power setting. Maximum speed at sea level was 170 mhp, and cruising speed was 165 mph at 75 per cent of power. Range was increased and take-off distance was reduced by as much as ten per cent, the company reports.

Kearney & Trecker to Add New Plant

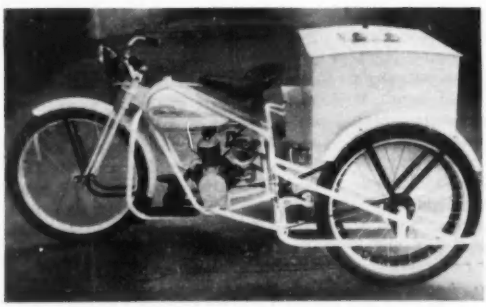
Kearney & Trecker Corp. will start soon on construction of a new plant for its recently formed special machinery division. A $5 million plant will be located on a 38 acre site in Milwaukee, Wis., and will have 193,000 sq ft of floor space. The expansion is related to Defense Department activities in pressed forgings for large aircraft sections. Investment for machine tools for the project will cost about $2.5 million. The company will finance the entire expansion program itself.

Inauguration on TV

Packard Motor Car Co. will sponsor most of the CBS television coverage of the Presidential Inauguration on Jan. 20. With General Motors Corp. already committed to sponsor the NBC TV coverage, sponsorship will be largely an automotive affair.

Finance Firms Leading Banks in Car Credit

Automobile finance companies continue to increase their lead over banks as a source of loans for automobile purchases. Last year finance companies handled 51 per cent of the automobile credit paper compared with 40 per cent for commercial banks. The 1951 figure is a sharp reversal from the 1946 ratio when finance companies handled only 36 per cent of the total dollar volume of automobile credit, with banks getting 54 per cent. Since that year, however, the ratio has been changing with commercial banks getting a smaller share and with finance firms taking the lead in 1949.



NEW CYCLE

The Simplex fifth-ton three wheel truck has a four hp, two-stroke engine, four forward speeds, option of foot operated clutch or automatic clutch controlled by the throttle. Brakes are internal-expanding. Prices start at $330.

L-M Creates Separate Mercury Sales Unit

Lincoln-Mercury Div. has altered its organizational structure by creation of a separate department to handle the sale of Mercury cars. It will be headed by C. L. Hostetler, who has been L-M sales manager in the Seattle district for the past 2½ years. He will be in charge of Mercury sales departments which will be established in each of the division's 23 district and five regional sales offices.

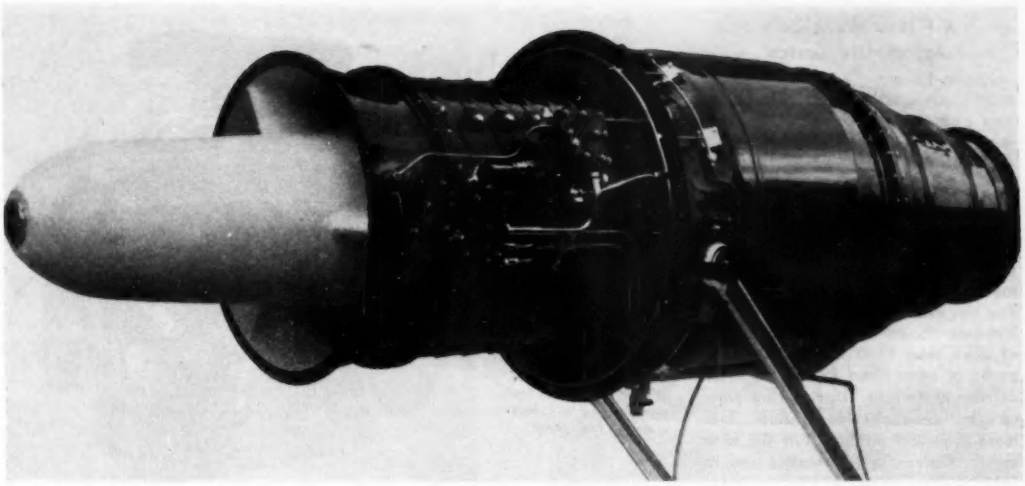
Military Truck Output Cut by Stretch-out

The stretch-out program has hit military truck production. Beginning Nov. 1, production schedules of military trucks were reduced about 25 per cent. The principal automotive companies affected are GMC Truck and Coach, Dodge, Reo, Studebaker, and Willys-Overland. The reduction does not constitute a cut in the total number of trucks to be produced, but merely means that the output rate will be slower than had been planned and the contracts will extend over a longer period. It is estimated that labor requirements will be cut 5 to 10 per cent by the stretch-out but that workers thus released will be readily absorbed on other jobs, since a manpower shortage exists in the automotive industry. It also is understood that tank production is affected by the stretch-out program but no details have been divulged.

Stewart-Warner May Merge

A merger of Stewart-Warner Corp. of Chicago and U. S. Machine Corp. of Lebanon, Ind., has been submitted to stockholders. Under the proposal all assets of U. S. Machine would be acquired by Stewart-Warner in exchange for capital stock of the latter company. Directors of both companies have approved the plan, although the amount of stock involved has not been disclosed. If the merger is consummated, the line of domestic, commercial, and industrial heating equipment made by U. S. Machine will be integrated with the Stewart-Warner line of heating equipment.

AND AVIATION INDUSTRIES



EXPENDABLE TURBOJET

The Armstrong Siddeley Viper ASV2 expendable turbojet engine was shown at the recent British aircraft show at Farnborough. Thrust in excess of the design rating of 1575 lb have been obtained. The Viper is to be used for both piloted and pilotless aircraft. Diameter is 23½ in., length is approximately 80 in. Commercial uses are also envisioned, but further details were not released.

GM to Offer $194,000 In Roads Essay Awards

General Motors Corp. announced it will provide $194,000 in awards to back its vigorous program for improvement and expansion of the national highway system. The awards are posted for best answers in a national essay contest on "How to Plan and Pay For the Safe and Adequate Roads We Need." The contest is the largest of its kind ever attempted and provides 162 national, regional, and state prizes. National advertising in newspapers, magazines, and on television is emphasizing the contest.

The first place national award winner will receive $25,000, with second place national winner getting $10,000, and third place $5000. Three national honorable mentions will get $3000 each. In addition, nine regional awards of $2500 each will be awarded and the writer of the best essay from each state will receive $1500.

The contest began officially on Nov. 11 with a filmed talk by C. E. Wilson, GM president, before dealer groups throughout the country. The contest closes midnight March 1. It is open to any resident of this country except contest judges and their immediate families. Essays will be judged on originality, sincerity, and practical adaptability rather than on literary merit. Although brevity is preferred, length of the essay is not limited and graphs, charts, drawings, photographs, estimates, or other supporting data are permissible.

NADA President Announces Highway Program for Members

Following months of planning with industry leaders, J. Saxton Lloyd, president of NADA, has announced the launching of a program by new-car dealers to stimulate state and local action leading to solution of the problems existing throughout the Nation because of inadequate highway and parking capacity. The association has published an analysis entitled: "The Case for Increased Highway and Parking Capacity." The study sets forth basic problems and interprets the broad needs.

The association's more than 34,000 new-car dealer members are being mobilized behind the program. Through special state highway committees, dealers will seek the support of, and closely assist, members of State Legislatures, State and local highway authorities and other public officials in state and local programs developed to bring about vitally needed increase in highway and parking capacity.

The dealer highway committees will work with appropriate public authorities in helping to determine realistic community, city, county and state needs, and in publicizing widely such information. Mr. Lloyd points out that approaches to individual solutions will vary from state to state and community to community as a natural outgrowth of the widely divergent problems that must be met. Recognizing that automobile dealers alone cannot work out complete solutions to the multiple problems to be faced, Mr. Lloyd adds, "We recognize that new-car dealers, already key community members, are obviously able to shoulder important leadership."

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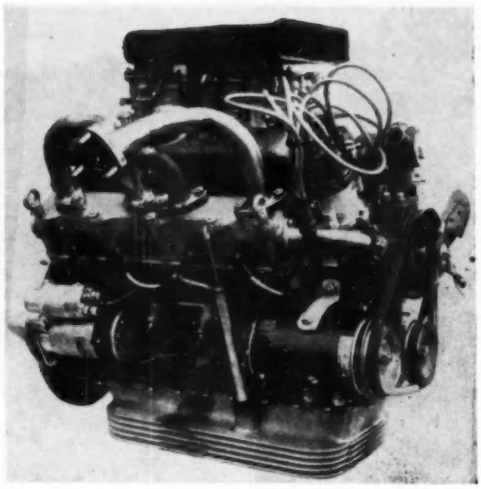
K-F War Work Cuts Automotive Losses

Kaiser-Frazer Corp. during the third quarter of this year reported its first profit in four years. The earnings, however, were entirely due to a profit on defense work with automotive operations still reporting a loss. A profit of $519,158 was earned on defense work during the quarter but this was offset by a loss of $175,094 for the automotive operations, leaving a net for the period of $344,064. For the nine months ended Sept. 30, however, the company had a net loss of more than $5.69 million despite a profit of more than $3 million from defense operations. During that period the automotive operations lost more than $8.7 million. For the nine months defense sales totalled nearly $115 million, with automotive sales accounting for about $98 million.

FIAT V-8



Powerplant of several recent French and Italian sport cars, the Fiat V-8 develops 110 hp at 5600 rpm. Cast iron liners are used with light alloy cylinders and heads. Compression ratio is 8 to 1. Bore and stroke are 72 x 61.3 mm (2.83 x 2.44 in.) for displacement of 1996 cc (121.76 cu. in.) Overhead valves operate from a single camshaft in the V. Two 2-barrel Weber carburetors are supplied by a chain driven fuel pump.

I-H Borrows $100 Million

International Harvester Co. announced it borrowed $100 million for expansion and new product development. Prudential Life Insurance Co. holds 3½ per cent promissory notes payable at $5 million per year beginning in 1963.

DoAll Demonstrates Cutters

The DoAll Co. recently began a demonstration of its new cutting tool program, with a traveling tool display mounted in a station wagon. Cutting tool specialists, who offer technical advice on tool application and selection, are able to demonstrate the line on the customer's premises. The plan operates through the company's sales-service stores.

Ethyl Realigns

A realignment of the research, application, and services activities of the research and engineering department of Ethyl Corp. was announced recently.

In place of the five divisions that have been functioning at the company's research laboratories in Detroit, three major divisions will operate under J. B. Macauley, director of research. Two of these are new. They are the product application division, with Richard K. Scales as director, and the automotive products research division, directed by Wheeler G. Lovell. The chemical research and development division, under George Kirby, will continue to function essentially unchanged at the Detroit laboratories and at the Ethyl manufacturing center in Baton Rouge, La.

The new product application division is organized in two main subdivisions—technical service with Dan M. Guy as director, and engineering research, with Harold Gibson as its head.

Two main research groups make up the automotive products research division. These are additives and deposits, under Hymin Shapiro, and engine combustion research, headed by Howard Hesselberg.

REGIONAL SALES OF NEW PASSENGER CARS

Zone	Region	September 1952	August 1952	September 1951	Nine Months 1952	Nine Months 1951	Per Cent Change Sept. over August	Sept. over Sept. 1951	Nine Months 1952 over 1951
1	New England	19,093	11,379	21,440	174,158	231,825	+67.79	−10.95	−24.88
2	Middle Atlantic	56,589	39,516	76,979	571,274	778,979	+52.11	−23.89	−26.66
3	South Atlantic	37,407	23,383	48,790	356,446	476,742	+59.98	−23.34	−25.23
4	East North Central	80,454	58,889	101,576	773,236	1,042,687	+36.62	−20.79	−25.84
5	East South Central	15,030	9,262	19,072	137,198	187,375	+62.28	−21.19	−26.78
6	West North Central	31,000	22,450	44,540	298,701	419,383	+38.08	−40.40	−28.78
7	West South Central	29,549	18,738	36,169	275,511	354,871	+57.70	−18.30	−22.36
8	Mountain	11,086	9,314	14,247	104,023	136,430	+19.13	−22.12	−23.75
9	Pacific	38,652	23,735	43,405	324,298	417,266	+54.42	−15.98	−22.28
	Total—United States	318,870	215,668	406,217	3,014,847	4,045,558	+47.85	−21.50	−25.48

States comprising the various regions are:—Zone 1; Conn., Me., Mass., N. H., R. I., Vt.—Zone 2; N. J., N. Y., Pa.—Zone 3; Del., D. of C., Fla., Ga., Md., N. C., S. C., Va., W. Va.— Zone 4; Ill., Ind., Mich., Ohio, Wis.—Zone 5; Ala., Ky., Miss., Tenn. —Zone 6; Iowa, Kan., Minn., Mo., N. D., S. D.—Zone 7; Ark., La., Okla., Tex.—Zone 8; Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo.—Zone 9; Cal., Ore., Wash.

AND AVIATION INDUSTRIES

New Concerns and Merger Announced

Carter Controls, Inc., has been formed to manufacture hydraulic and pneumatic equipment. Founder and president is J. Carter Miller, founder of Ortman-Miller Machine Co. Carter Controls will carry on manufacturing at its main plant and office at 2800 Bernice Road, Lansing, Ill.

Pyramid Mouldings, Inc., of Chicago, recently merged with the firm of Western Mouldings & Stampings, Inc., of Ontario, Calif. I. L. Reed, president of the parent company, announced that their new subsidiary has been renamed Western Mouldings, Inc., Division of Pyramid Mouldings, Inc.

Wilfred Williams, sales manager, and James W. Robinson, plant manager of the Acklin Stamping Co., Toledo, O., recently resigned to organize their own company, the Midwest Stamping and Manufacturing Co. in Bowling Green, O. Modern punch press facilities of the latest design will be installed. The company will specialize in the manufacture of pressed metal parts and assemblies for the automotive, household appliance, electrical, and agricultural industries. Modern facilities will also be available for spot-welding, riveting, copper-brazing, and painting.

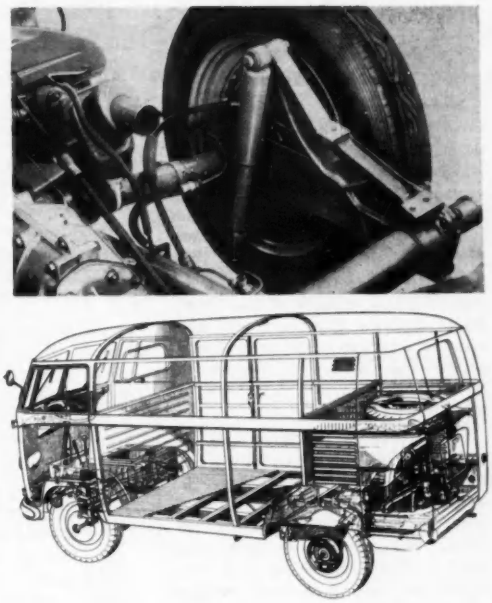
Southwest Opens Plant

Southwest Products Co., manufacturers of Monoball bearings and mechanical push-pull controls, will move into their new factory at Duarte, Calif., during the first week in January. The new building has a floor space of approximately 20,000 sq ft, and represents an investment in excess of $300,000.

ASF Chairman Named

Lt. Gen. Levin H. Campbell, Jr., wartime Chief of Ordnance and recently retired as executive vice-president of the International Harvester Co., was elected chairman of the Automotive Safety Foundation by the trustees at their recent annual meeting in Chicago. Gen. Campbell is a director of American Steel Foundries, Universal Oil Products Co. and Curtiss-Wright Corp., and the American Ordnance Association.

He succeeds A. A. Stambaugh, chairman of the board of the Standard Oil Co. (O), who retired from the post after a term of two years.



VOLKSWAGON

Improved model of the Volkswagon sedan has direct-acting shock absorbers, longer spring travel, three of four speeds synchronized, new carburetor, noise insulation. Three-fourth ton truck or bus has unitized body and chassis, with a reduction gear drive at each rear wheel.

1952 NEW PASSENGER CAR REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1952 Nine Months' Totals

MAKE	September 1952	August 1952	September 1951	NINE MONTHS Units 1952	Units 1951	Per Cent of Total 1952	Per Cent of Total 1951
Chevrolet	69,938	27,216	79,583	905,980	855,782	20.09	21.16
Ford	59,503	37,670	62,099	499,324	688,678	16.56	17.03
Plymouth	26,717	18,796	46,387	225,229	449,662	10.79	11.11
Buick	25,216	15,415	30,823	226,963	312,556	7.53	7.73
Pontiac	21,408	15,187	27,998	192,882	267,570	6.39	6.61
Dodge	15,270	14,959	28,402	186,814	237,437	6.20	5.87
Oldsmobile	17,400	10,255	22,145	158,712	218,792	5.26	5.41
Mercury	13,698	11,771	17,963	129,443	184,548	4.29	4.56
Studebaker	8,440	7,200	20,076	117,332	161,322	3.89	3.99
Nash	9,869	9,088	14,031	105,793	105,974	3.51	2.62
Chrysler	7,757	7,782	11,882	67,912	122,407	2.92	3.03
De Soto	6,157	5,691	10,340	67,853	87,690	2.25	2.17
Cadillac	8,854	7,510	7,698	66,325	75,026	2.20	1.85
Hudson	6,675	6,776	6,660	61,726	78,247	2.05	1.93
Packard	4,298	4,736	5,558	51,577	52,390	1.71	1.30
Kaiser	3,219	3,358	3,743	30,368	42,640	1.01	1.05
Willys	3,631	4,089	2,177	30,063	20,897	1.00	.52
Henry J	1,698	1,748	3,635	23,603	42,276	.78	1.04
Lincoln	2,775	2,756	2,402	20,744	20,146	.69	.50
MG (British)	726	852		5,696		.19	
Austin	555	432	385	3,941	2,822	.13	.06
Hillman (British)	530	440		3,549		.12	
Ford (British)	284	273	382	2,699	2,527	.09	.06
Crosley	139	209	421	2,533	4,356	.08	.11
Jaguar (British)	338	348		2,267		.08	
All State	181	157		1,251		.04	
Misc. Domestic	13	33	324	697	1,946	.03	.05
Misc. Foreign	983	517	1,303	3,629	9,867	.12	.24
Total—All Makes	318,870	215,069	406,217	3,014,947	4,045,556	100.00	100.00

* Based on data from R. L. Polk & Co.

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Bendix, Gould Mark Plant Expansions

New expansion of Bendix Aviation Corp.'s activities in guided missile development and production for the Navy was announced recently. The company has virtually completed a new environmental test building adjoining its missile section plant, Mishawaka, Ind., purchased in 1951.

W. L. Webb, former director of engineering and research of the Bendix Radio division, Baltimore, and most recently attached to the central office engineering staff of Bendix in Detroit, has been named manager of the missile section.

Gould-National Batteries, Inc., recently marked completion of its new $3 million plant at Kankakee, Ill., with a series of inspection tours for local businessmen, government officials, and civic and community leaders. With 200,000 sq ft of floor space, the plant will build military and civilian industrial batteries. About 300 persons will be employed when it gets into normal production sometime next year. The plant is said to be the largest single-unit producer of industrial type batteries west of the Atlantic seaboard.

Located on a 30-acre site, the new structure brings to 21 the number of plants operated by Gould-National in the United States and Canada. It is the fifth new construction either completed or started within a year as part of the company's $7 million postwar expansion and improvement program.

Germans to Test Ice-Free Road

A development of considerable importance to highway safety is reported from Germany. A five-mile test trip is being constructed using material incorporating a new agent known as "EC 999 AN," which is said to make the road material withstand severe sub-zero temperatures without formation of ice. Laboratory tests are encouraging and the road project, if successful, might lead to formation of ice-free roads in areas where icing is a hazard. Another property reported for the material is a water repellant characteristic, greatly reducing skidding on wet pavements.

Nine Months' Retail Car Sales Valued at $6,319,000,000*

	September 1952				Nine Months 1952			
	Sales		Dollar Volume		Sales		Dollar Volume	
Price Group	Units	% of Total	Dollars	% of Total	Units	% of Total	Dollars	% of Total
Under $2,000	169,106	53.56	$298,601,484	44.60	1,554,515	51.96	$2,746,134,505	43.45
$2,001 to $2,500	85,803	27.18	190,674,171	28.48	904,722	30.24	2,005,340,289	31.73
$2,501 to $3,500	44,079	13.96	118,578,003	17.71	397,651	13.29	1,073,282,010	16.98
Over $3,500	16,723	5.30	61,635,696	9.21	135,073	4.51	495,198,967	7.84
Total	315,711	100.00	$669,489,354	100.00	2,991,961	100.00	$6,319,955,771	100.00

*—Calculated on basis of new car registrations, as reported by R. L. Polk & Co., in conjunction with advertised delivered price at factory of four door sedan or equivalent model. Does not include transportation charges or extra equipment.
†—New registrations of American made cars only. Does not include imported foreign cars.

Belgium Considers Import Ban on Assembled Cars

The Belgian Government is reported to be planning compulsory assembly of automobiles sold in that country through an embargo on imports of assembled vehicles. According to reports, the ban will go into effect at the end of next year and will apply to any imported cars which are not brought into the country in knocked-down form and assembled in plants operated by Belgians.

Plants for Chase, Studebaker

A new plant is now under construction for the Chase Aircraft Co. The new plant, 160 x 1000 ft in area, will accomodate planes as high as 40 ft. Cost of the new plant is estimated at approximately $2 million. Construction time is estimated at eleven months.

Studebaker Corp. plant facilities in South Bend, Ind., have recently been augmented by a new 900 x 100 ft one-story building, built at a cost of more than $600,000, to be used for boxing and shipping knocked down passenger cars and trucks to overseas markets.

1952 NEW TRUCK REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1952 Nine Months' Totals

				NINE MONTHS			
				Units		Per Cent of Total	
MAKE	September 1952	August 1952	September 1951	1952	1951	1952	1951
Chevrolet	21,861	14,178	28,342	193,151	275,099	32.49	35.61
Ford	11,856	12,515	21,954	131,241	192,083	22.09	24.87
Dodge	8,909	10,867	8,653	77,293	81,021	13.01	10.49
International	8,861	8,176	8,906	70,698	70,250	11.90	9.09
G. M. C.	6,729	5,263	8,912	58,184	77,711	9.79	10.06
Studebaker	2,478	2,111	3,057	21,597	24,124	3.63	3.12
Willys Truck	1,034	966	1,302	8,318	11,522	1.40	1.49
White	878	881	845	8,296	9,456	1.40	1.22
Willys Jeep	671	863	786	6,106	8,689	1.03	.87
Mack	558	687	580	5,477	7,687	.92	1.00
Diamond T	273	271	312	2,614	3,577	.44	.46
Reo	305	320	238	2,429	2,721	.41	.35
Divco	268	176	251	2,174	2,984	.37	.39
Brockway	142	143	129	1,219	1,758	.21	.23
Autocar	130	98	116	1,152	1,601	.19	.21
Federal	66	70	50	636	794	.11	.10
Kenworth	66	81	51	548	517	.09	.07
Pontiac	36	18	64	379	641	.06	.08
F. W. D.	26	38	27	370	352	.06	.05
Peterbilt	21	24	20	184	230	.03	.03
Sterling	8	25	20	176	267	.03	.03
Misc. Domestic	188	181	166	1,755	1,166	.30	.15
Misc. Foreign	17	36	24	236	194	.04	.03
Total—All Makes	65,381	57,786	84,814	594,233	772,456	100.00	100.00

* Based on data from R. L. Polk & Co.

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers

Nash Motors Div.—Theodore Ulrich has been named chief engineer in charge of all body and styling activities. W. S. Berry has been appointed chief mechanical engineer.

Cenco Corp. — **Roy A. Kropp** has been elected a member of the board.

Atlas Corp. — **Ray O. Ryan** has joined the Convaire parent as a consultant.

Hiller Helicopters—**I. T. Kitzmiller** has been appointed secretary-treasurer.

Micromatic Hone Corp. — William J. Pinkerton was elevated to vice-president in charge of manufacturing.

Lincoln-Mercury Div., Ford Motor Co.—**C. L. Hostetler** was named manager of the new Mercury sales department. **W. S. Fenner** was promoted to manager of the industrial relations department of the jet engine plant. **H. H. Keays** was appointed manager of the Los Angeles plant.

Chrysler Corp.—New works manager of the Trenton, Mich., plant was **Milton E. Trueman.** He named **E. C. Freemen** as factory manager.

Ethyl-Dow Chemical Co. — Newly elected directors are **Joseph A. Costello, Donald K. Ballman, B. Bynum Turner,** and **Calvin A. Campbell.**

Le Roi Co. — **Frank Kuether** has been named executive engineer.

Chrysler Corp. — Brent C. Jacob, Jr., is now supervisor of quality control inspection.

American Steel and Wire Div. of U. S. Steel Corp.—**Floyd A. Garman** has been named chief engineer and **Walter V. Magee** is his assistant.

Gar Wood Industries, Inc.—**E. W. Hazzard** is now export manager.

Watson-Stillman Co. — **Robert S. Sweeney** recently became vice-president and general manager.

Industrial Filter & Pump Mfg. Co. —**R. F. Ledford** has been appointed director of sales and research.

Willard Storage Battery Co.—E. M. Slonaker was elected executive vice-president recently.

Ford Motor Co.—**A. C. Moore** has the new post of general manufacturing manager of the aircraft engine division. He is succeeded as general manager of the tank division by **John A. Swint.**

Micromatic Hone Corp.—**Myron P. Ellis** has been named advertising manager, and **Arthur B. Kowalski** has become factory manager.

Kaiser-Frazer Corp.—**W. V. Gillette** is now general superintendent of the aircraft service and spares department.

Pesco Products Div., Borg-Warner Corp. — Appointment of **Bruce H. Pauly** as aircraft sales manager has been announced.

Firestone Steel Products Co.—Paul L. Tracy was appointed comptroller and assistant treasurer.

Wellman Bronze & Aluminum Co. —Appointment of **Daniel T. Wellman** as president was announced by **F. S. Wellman,** who moves up to board chairman.

Necrology

Arthur W. Wragby, 65, retired superintendent of coach production at GMC Truck and Coach Div., died at Pontiac, Mich., Nov. 16.

John H. French, 71, banker and co-founder of predecessor of Briggs Mfg. Co., died at Detroit on Nov. 16.

John M. Pearson, 48, director of physical research for the Sun Oil Co., died at Swarthmore, Pa., on Nov. 16.

Walter C. Stuebing, Sr., 65, pioneer in the development of lift trucks, died Nov. 11 at Cincinnati, O.

Henry J. Crichton, 66, retired purchasing director for GMC Truck and Coach Div., died at Pontiac, Mich., on Nov. 10.

William N. Booth, 86, former vice-president and chief engineer of the Kelsey-Hayes Wheel Co., died Nov. 9 at West Palm Beach, Fla.

Willard T. Walker, 73, chairman of Walker Manufacturing Co., died Nov. 1 at Racine, Wis.

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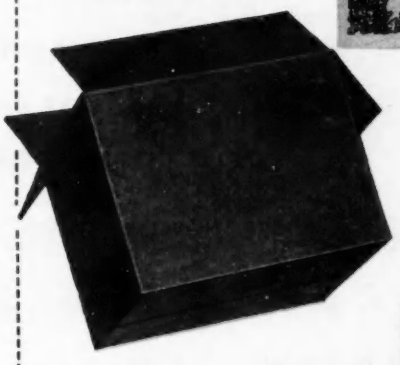

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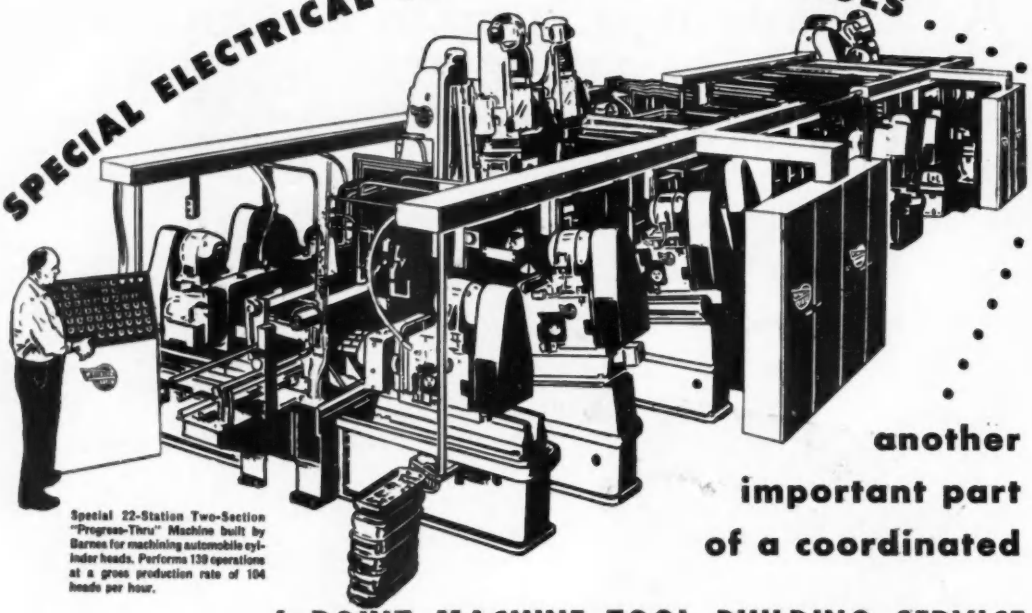

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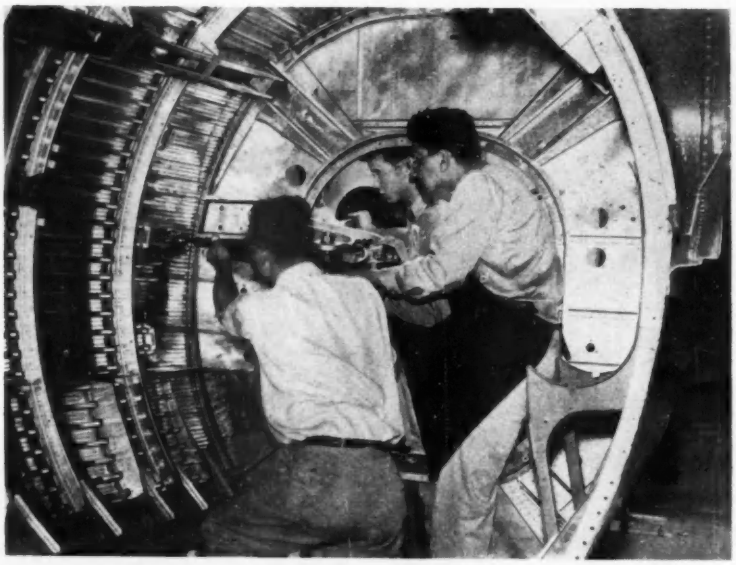
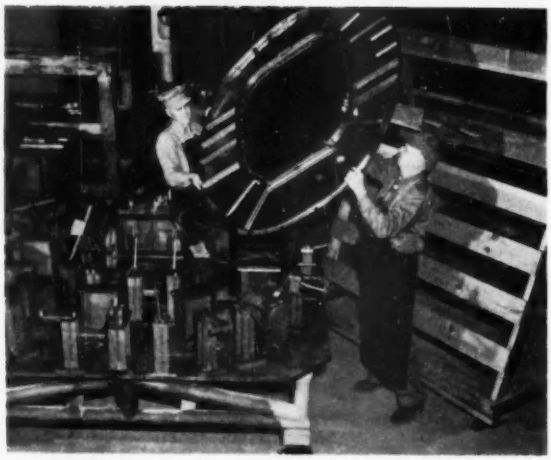




Above—

Assembling the stainless steel nacelle. Note the way in which stringers, channels and contour rings are used to reinforce the outer skin.

Left—

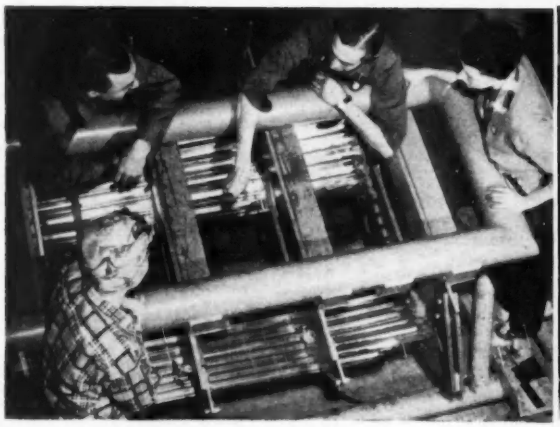
Firewall of the nacelle is checked on the inspection jig shown here.

Lower Left—

This illustration shows jigging used in assembling the nacelle's top skin.

Below—

Welding side panels of the stainless steel nacelle.



Stainless Steel Aircraft Nacelles

Present Many Production Problems

By J. A. Logan
Chief Production Engineer
Solar Aircraft Co.

FOR the first time in the aircraft industry, volume production of "all stainless steel" nacelles is under way. Solar Aircraft Co. is making the barrels in its San Diego, Calif., plant for the Lockheed P2V-5 "Neptune" patrol plane, which is powered by two Wright R-3350 Turbo-Cyclone (turbine compounded) piston engines, each weighing 3500 lb. Each engine is mounted on one of the Solar stainless steel nacelles, which weigh only 263 lb.

With the exception of a few small parts made of aluminum alloy, most of each unit is made of AISI Type 301 stainless steel sheet (Spec. AN-QQ-S-772). To meet Lockheed specifications, quarter- to full-hard steel is used in thicknesses from 0.012 to 0.050 in. Minimum tensile strengths range from 125,000 to 185,000 psi in the various hardnesses employed.

The Solar-fabricated nacelle is of semi-monocoque design, employing box-type longerons—rather than the ordinary tubular shape—for the engine mounts. The nacelles are about 65 in. long and in cross-section form an ellipse about four ft by five ft. The outer stainless steel skin is reinforced by 74 stringers and two channels (each made of four segments) and by two contour rings consisting of three segments each. Lengthwise in each nacelle, parallel to the stringers, are four longerons, used to attach the barrel to the wing and to which the engine mount is attached.

After the basic barrel is made, various additional pieces of hardware are assembled into position by bolting, spot welding or riveting, depending on the type of part.

The outer skin of each barrel is made of 0.012-in. to 0.020-in. sheet, formed on Hufford stretch presses over Kirksite punches that have been highly polished and impregnated with a lubricant. Immediate forming problems were encountered, and there were no guides for Solar to follow on this job. In forming the skins, the greatest difficulty was to find material whose yield point was far enough away from its ultimate tensile strength to enable stretch forming. This was further complicated by the fact that the skins must be aged 24 hours at a temperature of 490 F, plus or minus 25 deg. The aging results in the skins warping and going out of form sufficiently to cause an oil-canning effect in the final spot welding. If aging is done before stretch forming, it results in lowering elongation enough to cause excessive scrap. Consequently all forming must be done before aging with a very light stretch given after aging to regain contour. This procedure is being used on an experimental basis.

The outer skin is backed up with 0.012 in. stringers of full-hard material. The stringers are either of box type or hat section. Of the 74 stringers in each barrel, 19 require contour forming to the nacelle configuration. The stringers are formed into a hat section on Yoder rolls, and then stretch-formed to the contour of the barrel. Each side of the stringers has a turned-up edge that must be flattened in various places along its length to allow other pieces to be spotwelded to the assembly. As the stringers are full hard and in addition have been work-hardened, the putting in of the flat spots required considerable tooling development. For example, a die that would normally take 120 hours to build required 600 hours, as a result of the development work necessary to get the proper point of overform and relief built into the die.

The channels are formed on a press brake to channel section and then stretch-formed for contour, again on a Hufford stretch press. The dies in this case are of chrome-plated steel.

The contour rings that act as bulkheads in the assembly are formed in a hydraulic press over aluminum or steel form blocks depending on the sharpness of the radii involved in each part.

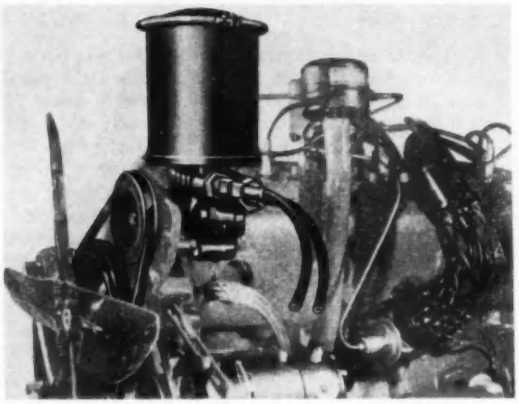
The forming problems have been the greatest difficulty in the barrel fabrication, as every die and forming tool had to be developed by trial and error; there was no data available.

Longerons, the main structural members of the nacelles, are box type sections, consisting of a web with two angles spotwelded to it. The straight web requires no forming, and the angles are formed on a Hufford stretch press or a hydraulic press.

Each barrel has 474 detail parts. To form the nacelle, Solar builds nine sub-assemblies. These in turn are built into five sub-assemblies which are joined in the final stages to make the barrel. The sub-sub-assembly jigs are all male type, supporting the structures on the inside. The sub-assembly jigs are female, supporting the structure from the outside. It would be of considerable advantage if Solar could jig from the outside throughout, but due to the design and the fact that spotwelding is necessary, some jigs must be made to avoid a shunting effect on the spotweld guns.

The first nacelle units assembled by Solar employed an out-of-the-ordinary final assembly procedure. This consisted of a circular track, with several nacelles in simultaneous staging on large rolling jigs. Now the nacelle assembly line has the jigs stationary in position, with the assemblies and welding guns moving.

(Turn to page 108, please)



Power steering pump mounted at the upper left forward end of the engine.

Packard Brakes and Air Conditioning System Also are Available on Packards for 1953

By Joseph Geschelin

Packard-Designed

In keeping with the new philosophy revealed by Packard Motor Car Co., recently, two distinct lines of cars have been unveiled for 1953, marking a major change in manufacturing and marketing policy. The Packard line features at the top custom-built cars including chauffeur-driven models priced up to $6900. It also includes a deluxe hardtop, a convertible coupe, and two luxurious family sedans.

The lower priced line—the Packard Clippers—includes two- and four-door sedans, available in both standard and deluxe models with engines of different horsepower ratings.

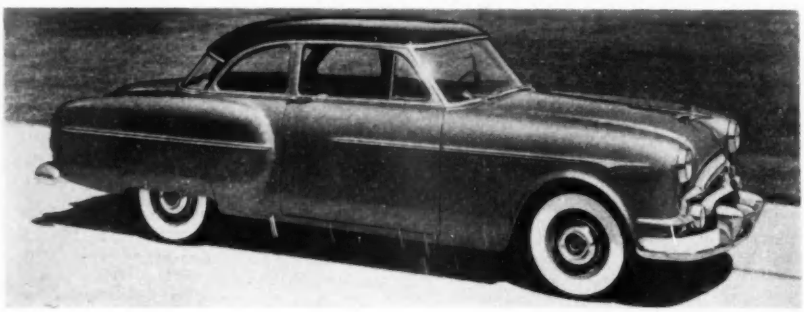
Among the special features offered as standard or optional equipment are included — power steering, power brakes, Ultramatic drive, and an air conditioning system. As will be described below, changes have been made in the power plants to provide added horsepower for 1953 cars.

On the Packard line, engine output has been upped to 180 hp (formerly 155 hp) with compression ratio of 8 to 1. Clipper deluxe engines are stepped up to 160 hp with compression ratio of 8 to 1. Clipper engines have been upped to 150 hp with compression ratio of 7.7 to 1. Increased output is attributed to a number of improvements, including increased compression ratio as well as a change in combustion chamber form in which there is a different contour over the exhaust valves as well as shorter length of flame travel.

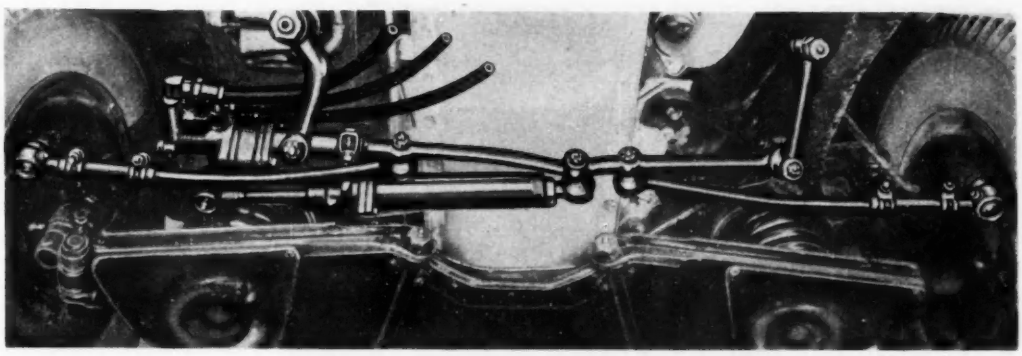
On the 180 hp Packard engine, increased output has required adoption of a four-barrel carburetor together with a new intake manifold. Longer wearing chromium plated rings also have been introduced on this engine.

In addition, improved choke control has been effected through the introduction of a new exhaust manifold heat control. Other features include: an anti-kickout starting drive; improved waterproofing of the ignition system; and more powerful windshield wipers.

Power steering, designed and built by Packard, using Bendix hydraulic elements, is made available as optional equipment on all models. Of simplified design, this unit is of linkage type not integral with the steering gear itself. While manual effort has been reduced about 80 per cent, the "feel" of full control has been left in. Power steering is in operation all the time so long as the engine is running.



Packard Clipper two-door sedan. Rear windows of Clipper models are of wrap-around type and have more glass area.



Details of the power steering linkage are shown in this view.

Power Steering

As illustrated, the Packard power steering system consists of elements tied in with the conventional steering gear including the following: a fluid reservoir, an oil pump, externally mounted control valve, and a power cylinder mounted in the steering linkage.

The oil pump, of rotor type, is located on a bracket at the left upper forward end of the engine, and is driven by V-belt. It supplies hydraulic fluid to the power cylinder at around 650 psi and in sufficient volume to meet any demand. The combination fluid reservoir and filter is mounted on the pump body.

The control valve is attached to the end of the steering linkage connecting rod and to the pitman arm by means of a ball stud mounted inside a sliding socket tube. The power cylinder is of double-acting type, the cylinder body being attached directly to the steering linkage connecting rod while the end of the piston is attached to the chassis frame.

As the engine starts, filtered fluid from the reservoir is drawn by the pump and forced under pressure through a flexible hose to the control valve. The control valve then responds to the movement of the steering gear, moving the control valve spool into proper position for the maneuver desired by the driver.

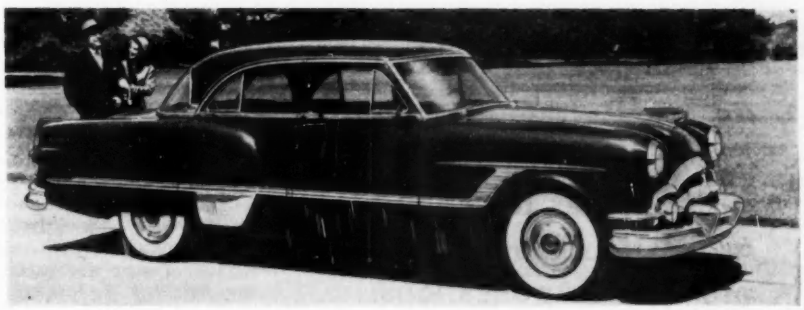
In addition to the mechanical changes noted briefly above, Ultramatic drive has undergone some detail improvements designed to facilitate quicker acceleration and generally improved performance.

Among such changes are a new reactor shaft, new first turbine casting designed to give added efficiency and increased torque multiplication, an improved governor assembly, improved pump check valves, a different arrangement of the throttle cross shaft, a clutch plate providing additional friction lag, revised high range clutch, and revised venting to increase plate life.

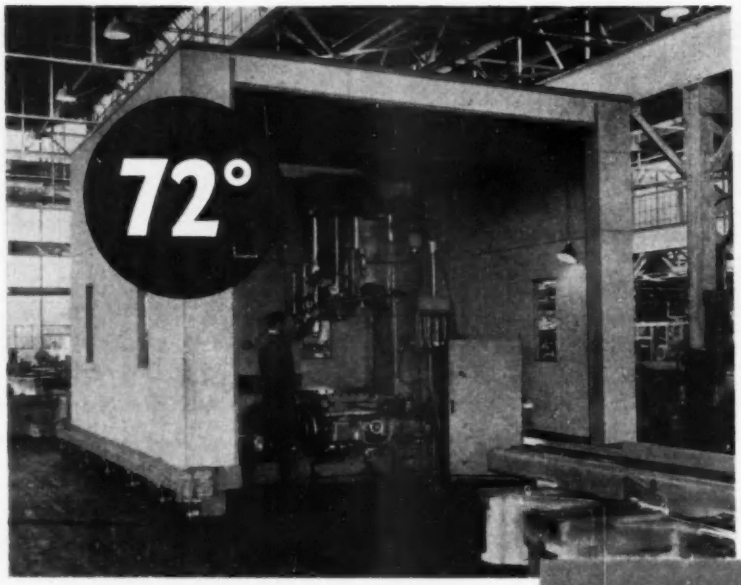
External car appearance has been enhanced in certain respects, one of the chief changes being in the roof lines of closed models. The roof line follows that of hardtop sedans, altering the silhouette and providing better visibility. Rear windows of Clipper models are of wrap-around type and have more glass area.

Packard and Clipper models are available in eleven body colors and a wide selection of upholstery options, including hand-buffed leather, nylon, bedford cord, and broadcloths. New insulation for better sealing and for quieter operation has been incorporated.

Other detail improvements include greater frame rigidity, increased strength in the rear axle, improved radiator cooling, quieter operation, and a better ride.



The 400 four-door sedan. The roof line of all 1953 Packard sedans follows that of hardtop sedans, altering the silhouette.



Left—An air-conditioned room is brought to the work at Pratt & Whitney. Large size, precision jig borers are enclosed in a portable room equipped with a Carrier 10-ton unit which keeps the temperature at 72 F ± one deg.

Special Report on

Air Conditioning

in Automotive and

- **Air Temperature Control**
- **Filtering of Air**
- **Dehumidification of Air**
- **Refrigeration**

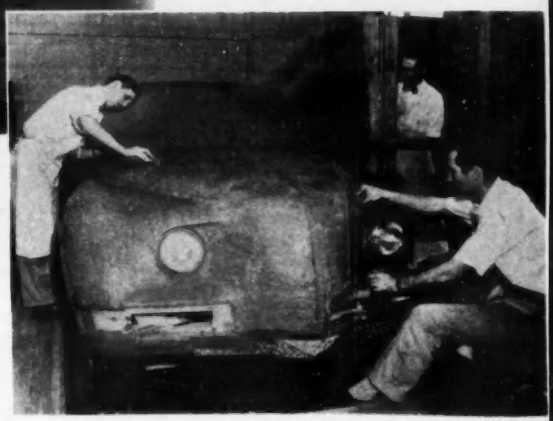
Here Is a Survey on the Increasing Use of Equipment for Control of Air Temperature, Filtering of Air, Dehumidification of Air, and Refrigeration as Applied to Manufacturing Processes. Described Are Various Techniques and Typical Applications.

By Thomas Mac New

FOR production and assembly operations, inspection, checking of gages, and research, many plants in the automotive and aviation industries have come to realize, in recent years, the growing importance of air temperature control, refrigeration, and full air-conditioning equipment. Numerous new methods of manufacturing have been made possible through the use of such equipment, and higher production rates, economy of production and better products are

Left—T-41 range finders are tested in this insulated cold chamber at Northrop Aircraft's Anaheim Div. Temperatures range as low as 85 deg below zero.

Below — Properly controlled temperature and humidity are necessary for best results in clay - modeling laboratories. Here Chrysler Corporation's Engineering Division personnel are preparing a clay model in a room air conditioned by an Airtemp unit using Freon as refrigerant.



and Refrigeration

Aviation Plants

some of the benefits which have resulted from its use. Many millions of dollars have been invested in these types of equipment.

Extensive Use by Chrysler

Air-conditioning and refrigeration are of prime importance to Chrysler's numerous manufacturing processes and research. In the main Dodge plant in Detroit, three Chrysler Airtemp packaged water chilling units, using Freon refrigerant, are used for the machines grinding camshaft thrust plates for Dodge and Chrysler engines. Temperature control for this operation is very important since without refrigeration, tolerances to which the machine can work are limited, pieces coming off the machines are too hot to handle and gage, and breaks in the bonding of the grinding wheels are frequent.

The three water chillers supply the grinding machines with 40 deg coolant water. Similar equipment is employed for grinding and honing operations at the Chrysler Jefferson plant and the De Soto Warren plant. At the Jefferson plant 10 Airtemp units are used, while the De Soto plant utilizies a 7½-hp Frostrode unit for a honing operation and several other Frostrode units for reducing the temperature of machine coolants. Both plants have air-conditioning and refrigeration equipment to make sure that pistons—which are passed through an anodizing process—are of constant temperature upon arrival to the gaging machine. Pistons are cooled from 130F to 70F. A 15 hp condensing unit along with mechanical and electrostatic filters and a cooling coil comprise the equipment at the Jefferson plant. Two 11 hp Airtemp packaged air conditioners are used at Warren.

Important roles are played by air conditioning and refrigeration in the production of automatic transmissions at the Chrysler Highland Park plant. They are used in the assembly room where torque converter parts are brazed and miscellaneous bolts are heat treated.

To minimize the hazards of foreign particles getting into the transmissions during assembly, the process

The laboratory that houses highly sensitive gage equipment at Ford, such as the automatic profilometer and optical comparator, is kept at a constant temperature because if the temperature were variable, heat expansion would change the dimensions of the parts being checked. Humidity is controlled to the extent that it prevents corrosion of equipment that must be accurately maintained.

...APPLICATIONS...

Air Conditioning and Refrigeration (Continued)

is conducted in an enclosure of approximately 645 sq ft of floor area which is air-conditioned by a five-hp Airtemp packaged air-conditioner. Filtered and conditioned outside air is also brought into the room to provide for leakage of air out of the room as a further aid in promoting a dust free atmosphere. A 76 deg temperature and a 50 per cent relative humidity are the average conditions produced in this area.

Brazing of intricate torque converter assemblies is ordinarily accomplished by using copper. Defense requirements, however, have forced a change to copper oxide. To use copper oxide for the furnace brazing operation, a highly dry atmosphere is required. This is obtained by air conditioning and activated alumina drying.

Air is passed through a series of water cooled heat exchangers for initial temperature reduction. Next, it passes through an air conditioning unit which reduces the temperature to approximately 36F. Finally, it goes through the alumina dryer. End result is an air stream having a dryness of 75 deg dew point. This dry air is then supplied to the brazing furnace. Thus, with the use of refrigeration and air conditioning, a manufacturing process not otherwise feasible is possible.

At the Highland Park engineering section, in addition to manufacturing processes, air conditioning and refrigeration are essential for testing and research. The low temperature performance laboratory—consisting of three cold rooms and two super cooled boxes—checks the performance of Chrysler products.

The temperature range of each of the three rooms is as follows: engine room and chassis room, 80F to −40F.; super cold room, 80F to −75F. In order to obtain the wide range of these rooms, three Airtemp compressors having a total of 150 hp are used.

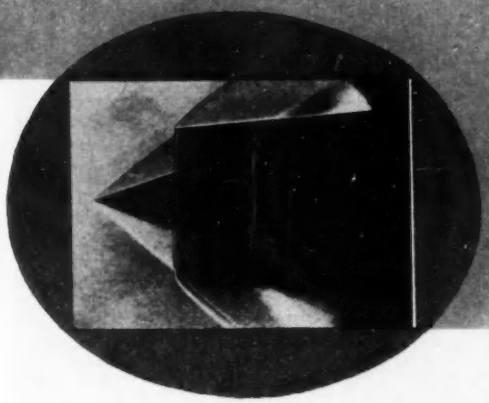
Individual three and five hp compressors are used to obtain the 80F to −90F temperature range of the super cooled boxes.

Tests are conducted in the engine cold room to determine and develop proper starting equipment. In the chassis room, which is large enough for three automobiles, vehicles are checked for warm-up performance. Other tests performed in this room include checking heater and defroster performance, batteries, speedometers and other instruments, oil filters, steering wheel materials, radios, and seat fabrics at low temperatures.

The parts checked in the super cold room include complete brake systems, complete steering assemblies, rubber parts, instrument panel knobs, leather upholstery, lubricants, and fuels.

To determine the effect of humidity on electrical parts, carburetor icing, engine rusting, etc., Chrysler has a large humidity controlled room. The temperature in the room ranges from 32 to 100F with humidity variations from 40 to 100 per cent.

Air conditioning with emphasis on humidity control is said to have materially improved operations in the clay modeling room where the cars of the future are modeled full size. Prior to the use of air conditioning, the clay models would sag because of variable condi-



This Schlieren photograph of a ram jet model, taken at the Curtiss-Wright supersonic wind tunnel, shows the "shock waves" formed as air flows past the engine's nose at twice the speed of sound. Without proper air drying equipment there would be considerable water showing in the illustration, and this would obviously compromise the worth of such photographs for analysis of the air flow patterns.

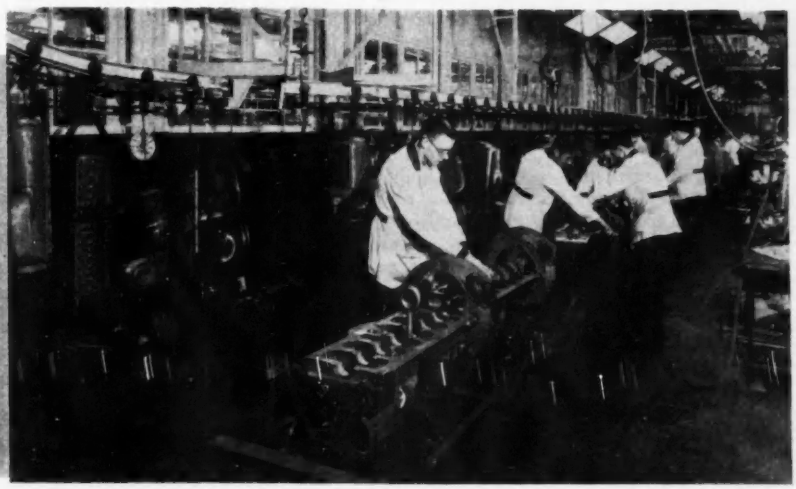
In performing some tests at Ford Motor Co., such as the one shown in this illustration, it is desirable to keep the room temperature reasonably constant in order to obtain reliable comparison test results and to provide comfortable conditions for the workers.

tions, thus making it difficult to get accurate measurements needed to build the actual models. Six Airtemp, five-hp packaged air conditioners are used in the modeling area. A plus or minus two deg temperature range with a plus or minus five per cent humidity are the conditions maintained in this area. Special controls are used for winter temperature and humidity control.

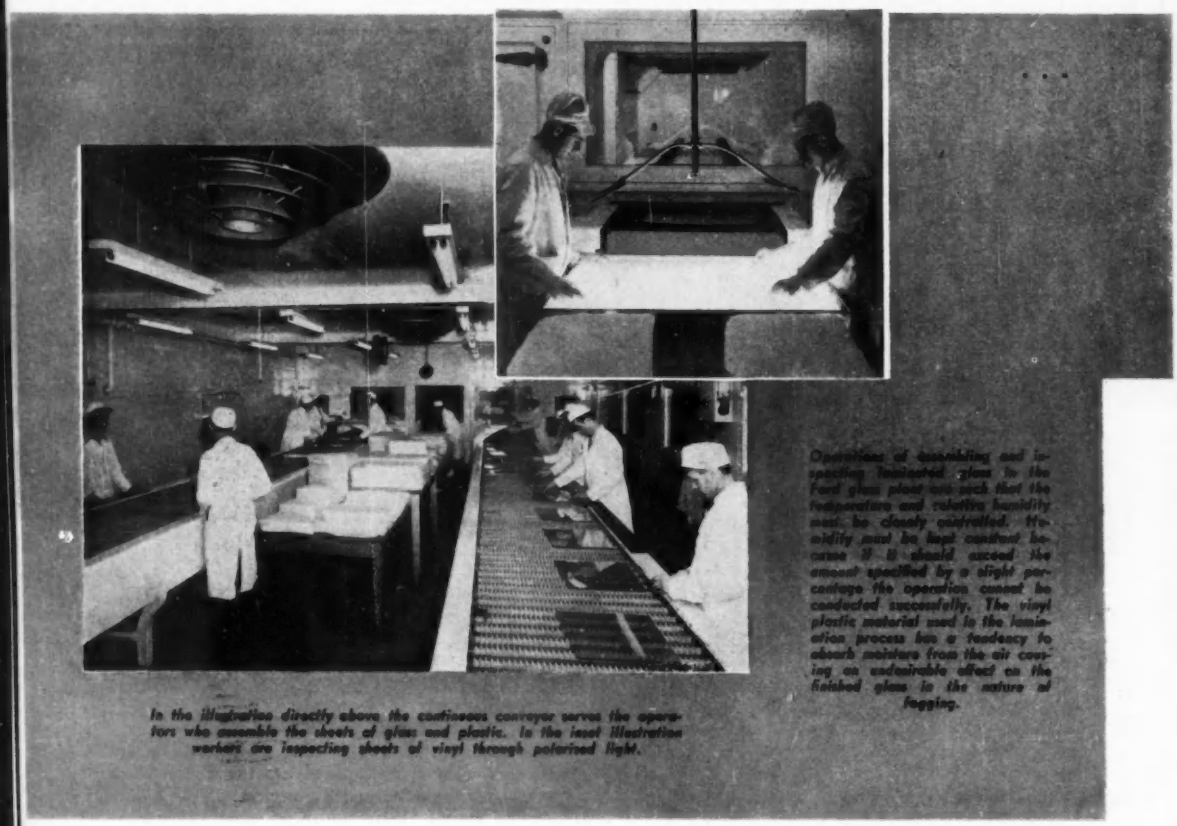
Quality Control a Factor at Ford

Use is made of air conditioning, refrigeration and temperature control in several plants of the Ford Motor Co. for manufacturing practices. These plants include the Rouge, Ypsilanti, Cincinnati (automatic transmissions), and the new Cleveland engine plant.

Using principally Freon 12 and a small percentage of ammonia as a refrigerant, Carrier, York, Worthington, Brunner, and Surface Combustion equipment are employed.



This is a view of the enclosed controlled atmosphere engine assembly room of Reo Motors. Conditioned and filtered air is supplied under presure through a system of multiple duct outlets. The system is so adjusted as to maintain a comfortable working temperature. The enclosure insulates engine assembly from the machine shop area, thus preserving the cleanness of all internal parts and assemblies.



In the illustration directly above the continuous conveyor serves the operators who assemble the sheets of glass and plastic. In the inset illustration workers are inspecting sheets of vinyl through polarized light.

Operations of assembling and inspecting laminated glass in the Ford glass plant are such that the temperature and relative humidity must be closely controlled. Humidity must be kept constant because if it should exceed the amount specified by a slight percentage the operation cannot be conducted successfully. The vinyl plastic material used in the lamination process has a tendency to absorb moisture from the air causing an undesirable effect on the finished glass in the nature of fogging.

In several places throughout Ford assembly and production, this relatively new technique is utilized to prevent dimensional changes due to temperature variations, protect surfaces from corrosion, and in the assembly of closely fitted and finished parts. To provide air of constant density and humidity for testing carburetors, special test rooms, equipped with humidity control devices, have been established. Air conditioning equipment has been installed in soundproof rooms where gear testing is carried out. This has been installed for the main purpose of providing worker comfort in the small enclosures. Practically all gage rooms have conditioning installations for maintaining measurement accuracy and for the protection of the gages against corrosion. Conditioning equipment has been installed by Ford in order to control temperature conditions in the manufacture of safety glass.

Many Installations at General Motors

At the AC Spark Plug Div., insulator injection molding machines are temperature controlled in respect to oil and die cooling. This particular application is necessary in the summer only, due to the high temperature of city water. Two 20-ton Frigidaire units are used for the purpose; Freon F-12 is used as the refrigerant. Air conditioning equipment for the control of manufacturing processes has been installed in two Allison Div. plants, No. 3 and No. 5. This has been done to facilitate the assembly of precision parts and to control the rust problem throughout the processes.

The 600 ton cooling equipment at plant 3 includes five Worthington compressors. A sixth unit of 1000-tons capacity has recently been installed. All of the units utilize Freon 11. With this setup, Allison chills water in a central location and distributes it to 61 air conditioning units strategically placed throughout the plant. The units handle from 15,000 to 55,000 cfm of air which is cleaned by electrostatic filters that are said to be 85 to 90 per cent efficient. All units are regulated by a Minneapolis-Honeywell system of pneumatic controls.

Operations are essentially the same at Allison plant 5, except that five York units with a capacity of approximately 6000 tons are used. Here the chilled water is supplied to 70 air conditioning units, each handling 55,000 cfm.

In another Allison plant, a three-ton Frigidaire unit, using Freon 12, serves to control temperature and humidity in the metallurgical laboratory for tests and

Air Conditioning and Refrigeration

It is essential at the Ford Cleveland Engine Plant to maintain constant temperature of the spectrometer laboratory so that metals tested will not be subect to varying conditions. The humidity is controlled only within reasonable limits to prevent corrosion.

A portable refrigeration unit designed by the El Segundo plant of Douglas Aircraft is shown being loaded with parts from a control refrigerator. The parts will be used in a foaming operation.

experiments which are carried on there. According to the company, air conditioning has been very effective in maintaining worker comfort, high efficiency, and less scrap in manufacturing by permitting close tolerances of precision parts and by controlling rust and corrosion on manufactured parts and on machines.

Use is also made at Allison of a Webber 18 cu ft freezer installation for treating a 72 in. broach bar. Through the use of cold application, broach life has been claimed to be increased. Typical treatment is to store the broach in the freezer at minus 125F until the tool is thoroughly chilled. The tool is then removed and allowed to return to room temperature. This treatment transforms the retained austenite to martensite.

Widespread use is made of factory air conditioning in several Buick buildings. For the soundproof rooms for matching gears, six Worthington air conditioners using Freon 12 and having a total capacity of about 65 tons are employed. The room, which is 30 by 150 ft, is cooled mainly for worker comfort, but air is filtered to remove dust which would settle on gears and interfere with the matching by sound.

In another set of soundproof rooms for matching differential gears, Buick has installed a 25-ton capacity Frigidaire, using Freon 12, and three Chrysler Airtemp three-ton package units. For the pressurized room where Dynaflow automatic transmission pump units are assembled, there are three Frigidaire package units of five-ton capacity.

Buick also makes use of a great deal of process refrigerating equipment. Four refrigeration units are employed in three different buildings for cooling anodizing solutions. One Graham 60-ton capacity steam vacuum unit, two Trane Centrevac units, using Freon 113, of 50 ton capacity, and one 25-ton Frigidaire,

using Freon 12 are utilized for this purpose. Dynaflow transmission gaskets are specially conditioned in a one-ton Frigidaire that uses Freon 12. Zinc plating solution are cooled by two Graham steam vacuum units totaling 100 tons capacity.

In the assembly of the Dynaflow, several parts are shrink fitted, and for this purpose several cold boxes are employed. These machines are designed for compound refrigeration and use methane and Freon 22 gas for refrigerants.

Chevrolet also utilizes air conditioning equipment in the assembly of its Powerglide automatic transmission. This is mainly to prevent dust from getting into the unit. Gage rooms also are supplied with conditioned air so that gages may be accurately tested.

At the Ternstedt Div. instrument plant both conditioned air and cold boxes are required in producing military instruments. Products must be assembled in air conditioned rooms where cleanliness, temperature and humidity ranges are maintained. To accomplish this, the plant uses primarily Frigidaire systems with Freon as the refrigerant. Certain parts of these instruments are made up of aluminum alloy castings and these are processed through a sulphuric acid anodizing solution. The temperature in this application must be controlled at 80F plus or minus one deg. Here again, the plant uses Frigidaire systems. In the testing of the various instruments manufactured, it is necessary to drop the temperature to −80F. This is accomplished in cold boxes using Frigidaire systems again, and Freon is employed as the heat transfer medium.

Precision Essential at American Bosch

This company makes use of air conditioning in three of its manufacturing departments in Springfield, Mass. These applications include temperature control as well as filtration and dehumidification of the air.

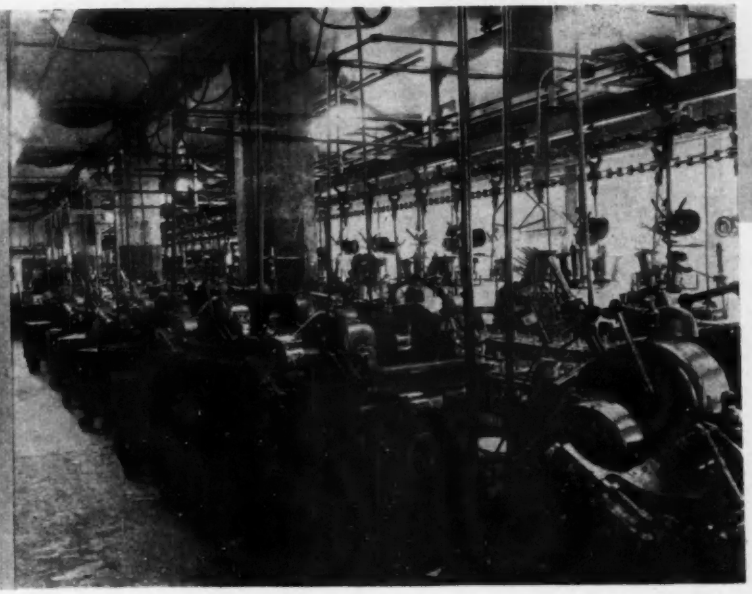
Plungers and barrels, the pumping elements in Diesel fuel injection pumps, must pump fuel oil at high pressures—up to 10,000 psi. Therefore, these pump elements are made with the highest type of precision. Plungers are fitted to barrels at exceedingly close tolerances—measured in millionths of an inch. Tests for pumping and pressure holding characteristics are to rigid standards. This requires a constant controlled temperature and dust-free air. For this the firm uses a Carrier system with Freon 12 as the refrigerant.

In another application, Diesel engine fuel injection equipment is assembled and tested. Here again clean air and uniformity of temperature in the assembly of

Chrysler Fire-Power V-8 engine pistons are inspected for size in a room in which constant temperature is maintained.

. . Continued . . .

Air Conditioning and Refrigeration



This is an interior view of the gear matching room in Buick's transmission plant showing the machinery and the air-conditioning outlets in the ceiling. Cleanliness is of utmost importance in this application.

these units are essential. Because of close fits and fine tolerances of the parts, it is necessary that their temperature be stabilized. This follows through into the testing and calibrating which is done in the same room. Even the testing oil is kept at a certain temperature and viscosity. A Westinghouse system, using Freon 12, is employed for air conditioning this department.

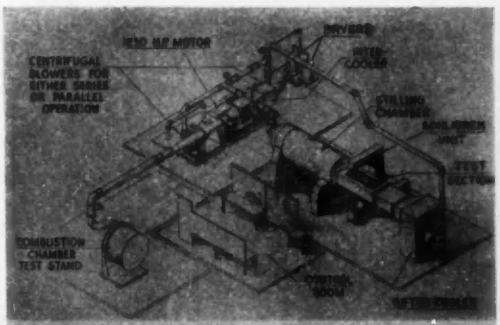
Another department, using a York conditioning system, assemblies and adjusts American Bosch voltage regulators. This room must be kept at a constant temperature to assure proper adjustment of the regulators. Dirt and perspiration also are harmful to these units, so it is necessary to work in a cool clean room.

There are several interesting examples of refrigeration in the American Bosch electrical laboratory. One is a regular commercial cold box, manufactured by Electric Device Co., that is used to condition products to certain specified low temperatures prior to test. The firm also has a special test cell for testing automotive voltage regulators. Built by Bosch technicians, the cell uses both heating and refrigeration with forced draft to maintain temperatures within a limit of two deg throughout a range of approximately minus 30F to plus 250F. Freon is the heat transfer medium. Another installation for testing provides temperatures from minus 50F to plus 250F. This is a Bowser unit which uses Freon for the refrigerant, and controls the humidity as required.

Refrigeration is employed also in the Bosch heat treating department. Here three refrigeration units capable of producing temperatures as low as minus 120F are installed. This low temperature is employed to produce a more nearly complete phase change in the cycle of heat treating some types of alloy steels. It produces certain desirable effects relative to physical properties and dimensional stability. The three refrigeration units were made by Motor Products Co.

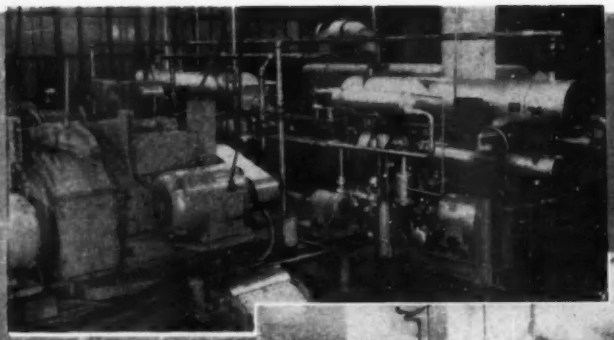
Thompson Shrinks Jet Parts

At the Thompson Products plant in Cleveland, Ohio, a Webber industrial freezer has been installed for the shrinking of large dimensional aluminum rings for turbojet rotor assemblies. The freezer has a temperature range from ambient to minus 80F, and it has a 45 cu ft capacity.

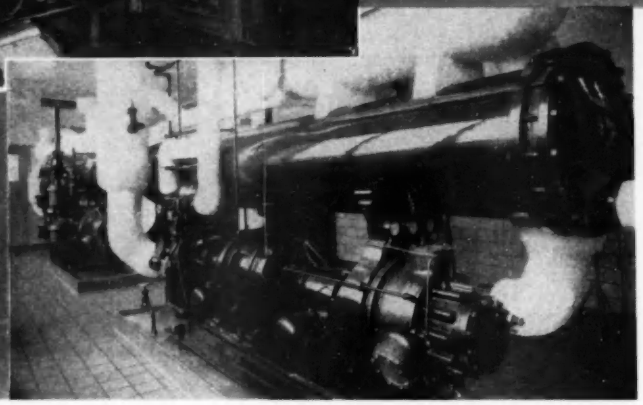


The general arrangement of the Curtiss-Wright supersonic wind tunnel circuit is shown in this sketch. Activated alumina dryers are used for dehumidification of the test air.

INSTALLATIONS..



This Chrysler Airtemp condensing and liquid cooling unit, using Freon refrigerant, is used in the main Dodge plant for cooling cutting fluids.



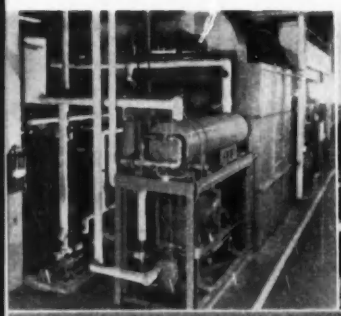
These Airtemp refrigerating units have been installed at Chrysler Corporation's Engineering Division for controlling the temperature in the super-cold test room.

Reo Motors Uses Liquid Chilling

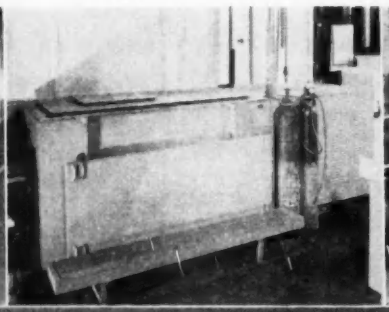
An interesting application of the self-contained liquid chilling equipment supplied by Acme Industries, Inc., is found at Reo Motors in Lansing, Mich. One installation of these packaged units serves a battery of three Barnesdril honing machines, fitted with Micromatic hydraulically-operated fixtures and hone equipment, for honing cylinder sleeves. Another unit is installed in connection with a cooling tunnel in which finish-machined cylinder sleeves are brought down to a standard temperature for final inspection.

To economize floor space, the Acme equipment serving the three honing machines is installed overhead on a platform in the vicinity of the machines. Here they have one 15-ton capacity refrigeration unit, and a second unit rated 7½ tons capacity, both of which are connected in series.

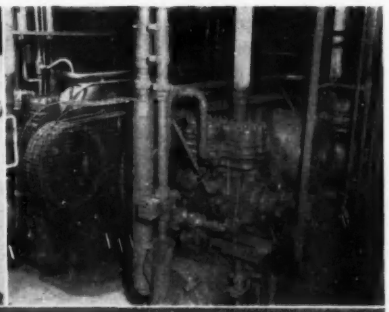
The liquid, in this case a kerosene mixture, is supplied to the honing machines at the rate of 20 gpm from a common settling and filtering tank. The liquid is filtered in the tank, then pumped to the chilling units overhead for cooling, and circulated to the machine sumps by gravity. Refrigeration rate is so



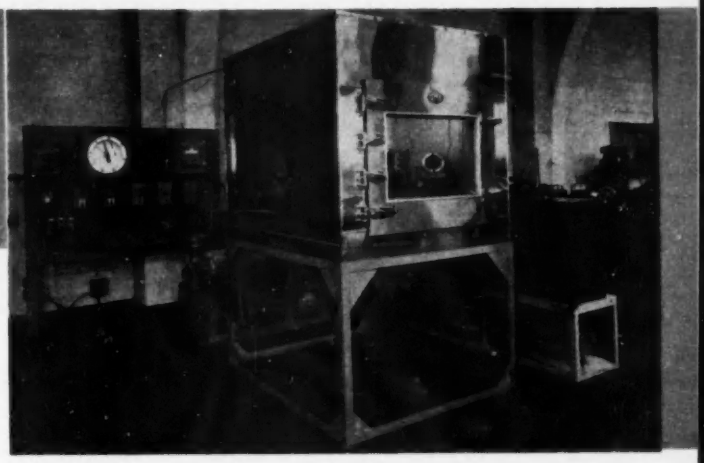
Aluminum alloy castings at Termstedt Div., GM, are processed through a sulphuric acid anodizing solution. The temperature of this solution must be controlled at 80 F, plus or minus one deg. Frigidaire produces the equipment for the temperature control of the solution.



A cold box, product of Frigidaire, using Freon as the heat transfer medium, is used at Termstedt Div. of GM in the testing of instruments where it is necessary to drop the temperature to minus 80 F.



Injection molding machines at the AC Spark Plug Div., GM, are temperature controlled in respect to oil and die cooling by the 20-ton Frigidaire units pictured here.



The Eclipse-Pioneer Div., Bendix Aviation Corp., utilizes a Webber low-temperature cycling unit, similar to the one pictured, for the testing of instruments at minus 60 deg. F.

adjusted as to supply the kerosene mixture at a temperature of 70 F directly at the honing tools.

Usually, only two of the three honing machines are in constant operation. Therefore, electrical controls are provided to automatically shut down the 7½ ton cooling unit unless all three honing machines are in operation.

The Acme chiller on the cooling tunnel has capacity for abstracting heat at the rate of 19,400 Btu/hr. It serves to reduce the constant load of finish-machined sleeves to a uniform temperature of 70 F to provide standard conditions for final inspection.

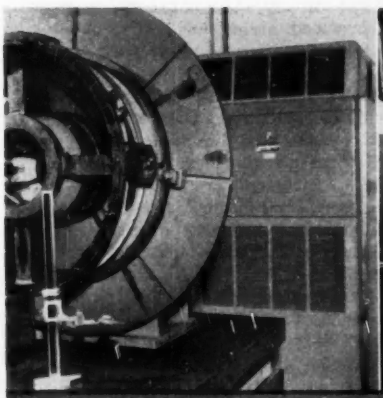
For Defense at Bendix

For the type-testing of dual tachometer-speedometer indicators and single tachometer-speedometer units, the Eclipse-Pioneer Div., Bendix Aviation Corp., is using a Webber hot-cold box. This box can be cycled from minus 65 F to plus 160 F. The instruments are subjected to a low temperature of minus 60 F for the test.

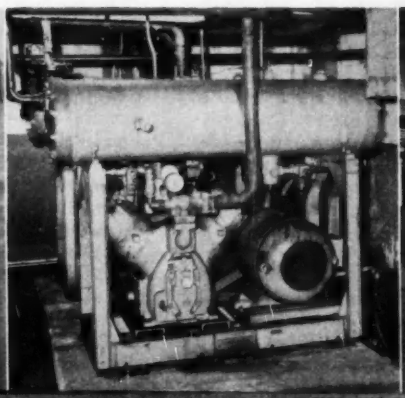
Clean Air for Painting Hudson Cars

The air conditioning, without refrigeration, setup at Hudson is similar to that used by many companies in paint processing. In the main Hudson plant, a half-million cu ft of air is sucked in from outside the plant and routed through a series of Precipitron filters, then blown to the units of the plant where the painting of hoods and fenders is carried out. At the Gratiot plant, the same process is accomplished on a larger scale. In

(*Turn to page* 122, *please*)



For use in defense inspection work at Buick, a five-ton Frigidaire cooling unit has been installed. It keeps a room 15 ft by 29 ft at a constant temperature of 60 F so that aluminum and magnesium parts for jet engines and tank transmissions can be checked accurately.



This illustration shows two of the six units used to cool the gear matching room in the Buick transmission plant. The bank of units is made up of two 20-ton, two 7½-ton and two five-ton Worthington units. The sound-proof room, 30x150 ft, is used to match gears into quiet-running sets.

This is a view of the York system which air conditions part of the American Bosch voltage regulator assembly room. This room must be kept at a constant temperature to assure proper adjustment of the regulators. Dirt and perspiration also are harmful to the regulator units, so it is necessary to have the work done in a cool clean atmosphere at all times.

British Makers Introduce New Models

at London Show

By W. F. Bradley
Special European Correspondent
for AUTOMOTIVE INDUSTRIES

LONDON, ENGLAND

BRITAIN'S Thirty-Seventh Automobile Show for passenger cars, equipment, trailers, and marine engines, which ended November 1, marked the fiftieth anniversary of the foundation of the Society of Motor Manufacturers and Traders. It was opened in Earls Court, London, by Field Marshal Earl Alexander of Tunis. Totalling 515 exhibitors, the British industry dominated with 32 makes of passenger cars. 19 were from the United States and Canada, eight from France, three from Italy and one from Spain. Germany and the Central European countries did not appear. Despite all the facilities offered foreign visitors, the number from abroad did not appear to be as great as at Paris and other Continental shows. London has a much more national aspect than any exhibition in Europe. By reason of the improved possibilities of obtaining deliveries, particularly of the higher-priced cars, and the removal of the "covenant" restriction on many makes, public interest was undoubtedly higher than at immediately preceding shows.

Highlights were the adoption by Rolls Royce and Bentley of a modified type of General Motors Hydra-Matic transmission; a new high-priced six by Armstrong Siddeley; a Morris production car fitted with the Austin valve-in-head engine; a new four-cylinder integral body and frame car by Wolseley; a new Humber Super Snipe by the Rootes Group; and a link-up between Austin and Healey with the object of putting a medium-priced sports runabout on the American market.

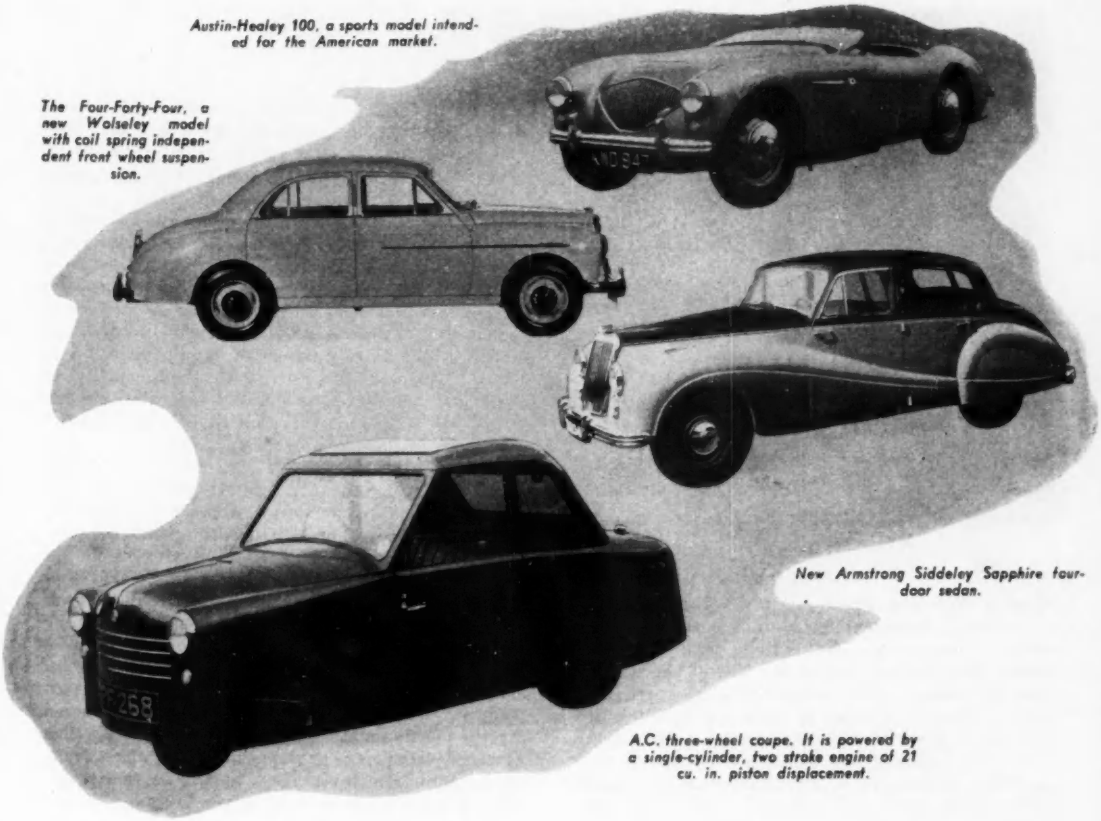
The Rolls Royce organization announced that after long co-operation with General Motors it had been decided to equip the left-hand drive export models of both Rolls Royce and Bentley with a modified type of the Hydra-Matic transmission as optional equipment at no extra cost. This application does not apply to the recently-introduced Bentley Continental sedan. The principal difference between the American and the British productions is that the latter has the Rolls Royce servo-motor and oil pump for shock absorber control built into the rear of the transmission housing.

Armstrong Siddeley's new car is the Sapphire, powered by a 209.64 cu in. six-cylinder, valve-in-head engine having a compression ratio of 6.5 and developing 120 hp at 4200 rpm. Armstrong Siddeley has adopted a square engine with a bore and stroke of 3.54 in. (90 mm). Its hemispheric combustion chambers have valves inclined at 70 deg, with operation from a high chain-driven camshaft and pushrods of unequal length. The long rods operate the smaller diameter exhaust valves. Wet iron liners with a high chromium content are used. The carbon steel crankshaft is carried in four bearings and has a diameter of 2¾ in. Pioneers of the Wilson epicyclic transmission, Armstrong Siddeley continues this with the addition of pre-selection through individual solenoids. The pre-selector control gear is in the form of a small gate mounted just below the steering wheel. Optionally this model is supplied with a standard four-speed synchromesh transmission.

At the front end vertical coil springs and support arms provide independent suspension, and an anti-roll bar is fitted. A feature is that the whole front assembly, comprising a heavy cross member, support arms, coil springs, steering pivots, etc., can be removed as a unit. Semi-elliptic springs are used at the rear. Final drive is Hotchkiss type to a Salisbury hypoid axle. Two body styles are provided. Weight of the sedan, with full tank is 3640 lb. Wheelbase is 114 in.

First tangible proof that Morris and Austin are operating in partnership is to be found in the use of the Austin valve-in-head engine on the four-door Morris Minor sedan for export only. This unit develops 30 hp at 4800 rpm and gives 40 lb-ft torque at 2400 rpm, whereas the figures for the L-head engine are 27.5 hp and 39 lb-ft. The final ratio is 5.28 to 1 in place of 4.55 to 1. Maximum speed remains the same, but there is better acceleration. In all other respects the changes in the Morris line are of a minor nature.

Wolseley, of the Nuffield group, showed a new model in the "Four-Forty-Four," a unit frame-body con-



Austin-Healey 100, a sports model intended for the American market.

The Four-Forty-Four, a new Wolseley model with coil spring independent front wheel suspension.

New Armstrong Siddeley Sapphire four-door sedan.

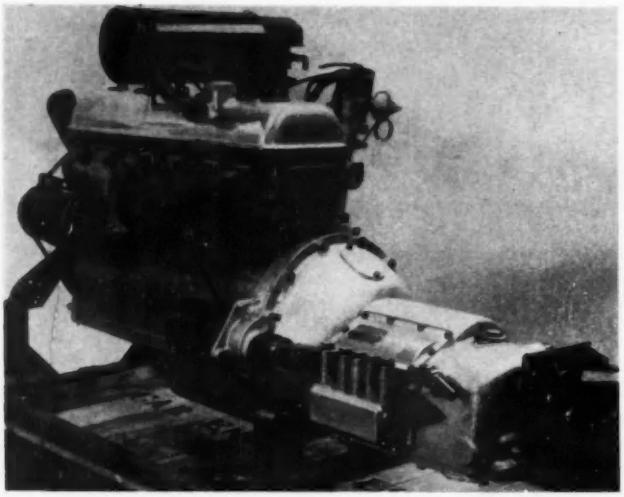
A.C. three-wheel coupe. It is powered by a single-cylinder, two stroke engine of 21 cu. in. piston displacement.

struction with a wheelbase of 102 in., powered by a four-cylinder valve-in-head engine of 76.28 cu in., the power output of which has not been revealed. The body shell, produced by Steel Pressings, features two forward tubular extensions united by a cross member and providing mountings for the engine, front suspension and radiator. Wolseley has dropped torsion bar susension on this model in favor of coil springs and unequal length support arms. The coil springs and the direct-acting shock absorbers within them have their abutment on the extremities of the curved cross member uniting the forward extension tubes and passing under the engine. Rack and pinion steering has been adopted. The Wolseley Four-Forty-Four is a four-door sedan with forward hinged doors and weighs 2520 lb. It enters into the $1792 class.

The Rootes Group featured an entirely redesigned Humber Super Snipe, with a 118¾ in. wheelbase and a new valve-in-head engine of 252.4 cu in. displacement. Its compression ratio is 6.48 to 1 and output is 113 hp at 3400 rpm. This engine, which replaces a side valve unit, has a seven bearing crankshaft with a diameter of 2¾ in. Connecting rods have their ends split diagonally to allow of drawing through the cylinder barrels, the two halves being positioned by hollow dowels. The rods are drilled for lubricating the piston pins. Power is transmitted through a 10 in. Borg & Beck clutch to a fully synchronized four-speed transmission, and then by an extended enclosed and splined tail shaft to the open drive shaft. The propeller shaft is slightly offset to allow of a more compact construction of the ring gear and differential case, and to make the axle shafts of equal length. Suspension has undergone no change, being by coil springs in front and semi-elliptics at the rear. Body styling is similar to that of other models in the Rootes line.

During the show announcement was made that Austin had linked up with Donald Healey to produce the Austin-Healey 100 sports model. Apparently the intention is that this car shall aim for the American market, where it will come inside the $3000 class, and will undercut all other British sports models now on the market. It will be marketed throughout the world by the Austin organization, but home sales will be handled by Healey. It was stated by Donald Healey that this arrangement with Austin would not interfere with the Healey-Nash set up.

The Austin-Healey 100 is powered by the Austin A-90 four-cylinder valve-in-head engine of 162 cu in. It has a compression ratio of 7.5 to 1 and develops



Armstrong Siddeley overhead-valve engine with electrically-actuated, preselective transmission.

90 hp at 4000 rpm. The car is fitted with the Austin coil spring independent front suspension and Austin rear axle. Its chassis differs entirely from that of the Healey-Nash, being composed basically of two straight three in. square section side rails 17 in. apart, with square-section cross members and a central x-member. Stiffness is given by making the cowl a part of the frame, the bulkhead unit being welded to the body mounting supports. The floor stampings are welded to the chassis frame and additional stiffness is given by welding the body to the frame structure. The body frame is a composite structure, the main panels being of aluminum and the fenders and doors of steel. The rear axle is mounted above the side rails, the standard ratio being 3.66 to 1, with 4.125 to 1 supplied if the optional overdrive is fitted. Wheelbase is 90 in.; height with top up is 49 in., and curb weight is 1960 lbs. This car was officially timed at 111 mph over a Belgian motor road. The Healey Nash is being continued with the six-cylinder Nash engine.

Frazer Nash, specializing in high-performance cars with the Bristol power plant, has added a model equipped with the Austin A-90 engine, selling at a much reduced price.

The Jowett Co. has practically rebuilt the flat four 91½ cu in. Javelin, carrying the horsepower up to 52 at 4500 rpm. A stiffer crankshaft is used, the oiling system has been improved, the cylinder heads—including the combustion chamber and the ports—are polished, and the oil pump is of larger capacity.

Sports models are a stronger feature at the British than at any other European show. Allard, which aims especially at the American market, has a new tubular frame chassis with a wheelbase of 112 in., normally powered by the Ford V-8, but also designed to accommodate the Lincoln, Chrysler and Cadillac power plants. The layout features a De Dion type rear axle with coil spring suspension and a divided front axle, also with coil springs. The range of cars coming under the sports classification varies from a standard chassis with a runabout body, to practically a racing job, the most advanced example of which was the Spanish Pegaso supercharged V-eight.

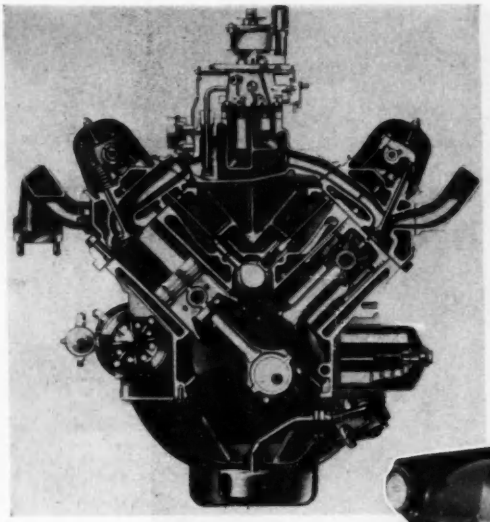
No British automatic transmission has yet been put into production, although development work is being carried on in several quarters. The Hobbs planetary transmission, which was shown at earlier exhibitions with full manual control, now has been developed to an automatic type and is being used experimentally on buses. The basis design remains unchanged; it consists of two friction clutches operated by oil pressure, three brakes similar in construction to the clutches, and an epicyclic gear unit. Normally gear changes are effected by means of a manually operated control valve which directs oil pressure to the clutches and brakes to give changes of ratio. In the automatic version the control box serves a similar purpose and consists of a housing containing two pistons which open and close a series of oil passages. A governor piston is under pressure from the clutch circuit at one end and from the output-driven pump at the other end, thus striking a balance between throttle opening and engine speed or road speed. The governor piston opens or closes inlet ports which admit oil pressure from the brake circuit or exhaust ports which release this pressure. Changes down are effected by spring pressure and changes up by oil pressure. Changes down can also be effected by a kick-down action of the throttle.

The British Lockheed Co. presented the Manumatic clutch control, eliminating the use of the clutch pedal. The device consists of an automatically-operated clutch controlled by centrifugal force and by a vacuum servo cylinder and an electrically operated valve to control the vacuum admitted to the servo. The clutch has an additional intermediate plate carrying weights which move outwards under centrifugal force and apply force to the pressure plate. Gear shifts are carried out by moving a small gear lever, the initial movement of which closes a switch and energizes a solenoid on the electro-magnetic control valve. This valve places the vacuum reservoir into connection with the vacuum-servo cylinder which operates and disengages the clutch. Subsequent movement of the gear lever engages the desired gear and the last portion of the movement opens the switch and allows the clutch to re-engage. Consequently there is no clutch pedal operation required.

Two disk brakes were seen at the show, one being by Lockheed and the other by Girling, the two being similar in general design, with the operation of friction pads through hydraulic pistons. These have not yet been applied to production cars.

The A.C. Co., which up to the present has specialized

(*Turn to page* 102, *please*)



Transverse sectional view of the 205-hp 1953 Lincoln engine. Note details of new intake manifold and four-barrel Holley carburetor.

1953

Lincoln Improvements

Capri four-door sedan.

THE Lincoln line for 1953 will feature a large increase in engine output, to 205 bhp, accomplished without changing basic design or dimensions; an adaptation of the Saginaw hydraulic steering gear offered as optional equipment; and introduction of Bendix power brakes as optional equipment.

Basically the Lincoln line consists of the Cosmopolitan and Capri models with a four-door sedan and sport coupe in the Cosmopolitan; four-door sedan, hardtop, and convertible in the Capri model.

The 317 cu in. V-8 engine introduced last year has been upped to 205 bhp output by making some detail changes and adoption of a new four-barrel Holley carburetor. The cylinder head is different, and features a higher turbulence combustion chamber and 8 to 1 compression ratio. Increased breathing is obtained from a combination of changes—larger diameter intake valves; increased valve lift demanding a new camshaft introduced late in 1952; and an entirely different intake manifold incident to the introduction of the four-barrel Holley carburetor. In addition, special rubber seals of umbrella type are provided over valve stems to improve oil economy. The piston ring setup is modified by the use of expander type oil rings to further improve oil economy.

The new carburetor incorporates some interesting features said to represent unique practice, and provide improved fuel mixing. It has a "suspended" float bowl mounted away from the metering elements of the carburetor. It also has a two-stage idle adjustment—for hot, and for fast idle conditions, and a choke interlock has been added.

One of the unusual features of the setup is the linking of the distributor advance with the carburetor by means of a push-pull cable, providing for immediate manual spark advance as the throttle is opened—actually about 18 per cent increase. This feature results in immediate engine response to the throttle.

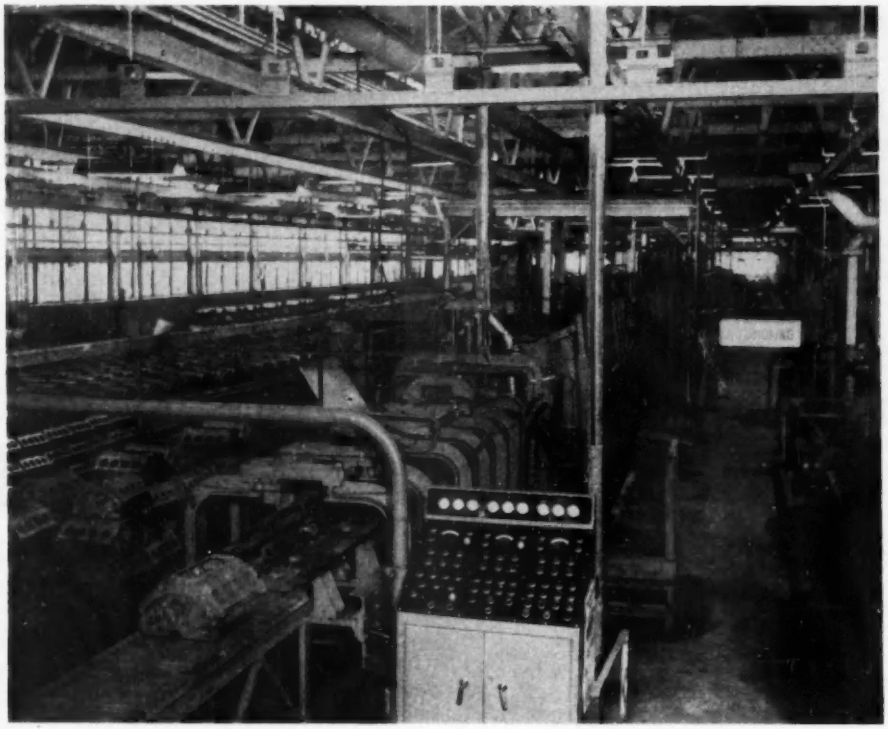
With the changes in the induction system, the torque curve peak has been extended over a wider range, and idle vacuum increased considerably. Fuel economy too has been improved to a specific fuel consumption of only 0.5 lb/bhp/hr at the top range, with a flatter fuel consumption curve over the entire operating range.

The exhaust system consists of a muffler and two resonators while the tailpipe is of larger diameter. All tend to reduce back pressure.

Power steering, requiring only around four lb pull on the rim of the steering wheel while parking, provided by a Saginaw hydraulic steering gear, offered as optional equipment. The oil pump for this gear is mounted on the front end of the engine, driven by V-belt, and fitted with overhead oil reservoir and filter.

Bendix vacuum power brakes, available as optional equipment, assist in reducing pedal pressure by at least 25 per cent. the suspended brake pedal arrangement is on a level with the accelerator pedal. Besides requiring less effort, these brakes are actuated with considerably less pedal travel. In the Bendix design the vacuum element is mounted integrally with the master cylinder, the entire assembly being attached to the dash and directly connected with the brake pedal.

Another unusual feature, offered as optional equipment this year, is the "four-way" front seat power adjustment. It provides for individual power adjustment fore and aft—using one switch; and up and down by means of another switch. Horizontal movement is 4¼ in., vertical, 1½ in.



Here is the Cincinnati horizontal tunnel broach which consists of three separate units, each 53 ft long.

Dodge Solves Tooling for New

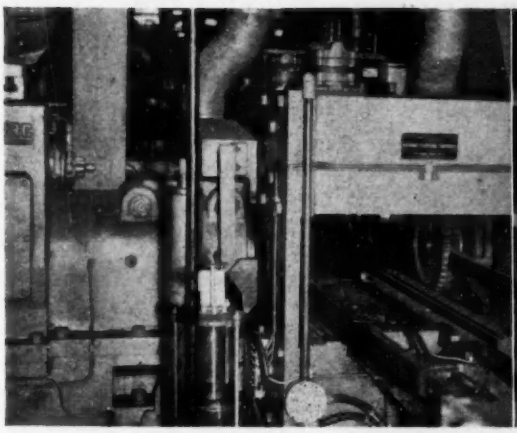
ONE of the most interesting features concerning the new equipment that has been installed in the main plant of the Dodge Division, Chrysler Corp., for the production of the 140-hp, V-8 engine is that some of the machine tools on the production line were built by Dodge. This was due to the fact that adequate tooling could not be obtained directly from some machine tool builders at the time, because of defense orders. Since it was desired to put the new engine in production as early as possible, machine tool companies cooperatively worked with Dodge Master Mechanics Division to enable the automobile manufacturer to produce the necessary machines.

It was proved by Dodge that transfer machines are still more versatile and flexible than heretofore thought possible. As an example, Dodge had a transfer machine, 80 per cent complete, that was to be used for work on an automatic transmission, and they readily adapted the entire unit for work on the new V-8 engine.

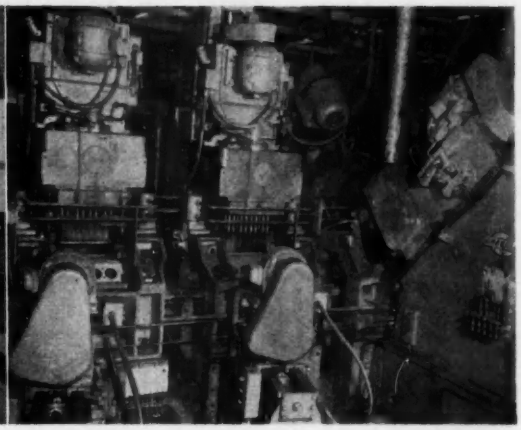
While Dodge had to go into the machine tool business for a brief period to get at least one engine line underway, tooling is now being produced by the machine tool suppliers for other lines. When all of the lines are in full operation, a total of 2400 engines per day will be produced. The current rate for one line, with some machines yet to come, is 1000 engines per day. It will produce 1200 per day when tooling is completed.

Featuring huge transfer machines for the production of major components, Dodge has utilized the latest available machine tool designs for the quantity and quality production of the V-8. Because there has been so much new equipment installed throughout the engine plant, only a portion of the 12 transfer machine cylinder block line will be covered in this article.

For the first operation on the cylinder block, it is automatically loaded, crankcase down, into the first of a three-section Cincinnati horizontal hydraulic tunnel type broaching machine. The rough casting is located in the broach by means of four core plug holes and equalized underneath from No. 3 main bearing



Engine block front faces are roughed and finished, and rear faces are rough and semi-finish milled on this Fitchburg machine.



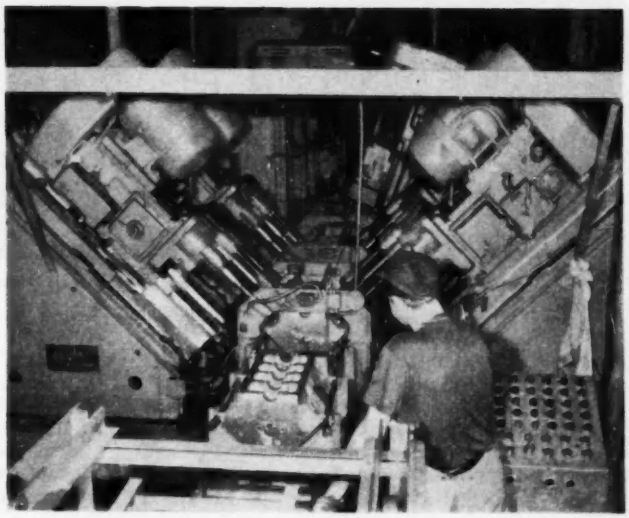
Two of the 17 stations of the Greenlee machine which drills holes in the top, cylinder head faces, oil filter pad, and tappet bosses.

This Article Describes and Illustrates Many Machining Operations on the Cylinder Block of Dodge's 140-HP Engine. Another Article, Devoted to Production of Cylinder Heads, Will Appear in an Early Issue of Automotive Industries.

By Thomas Mac New

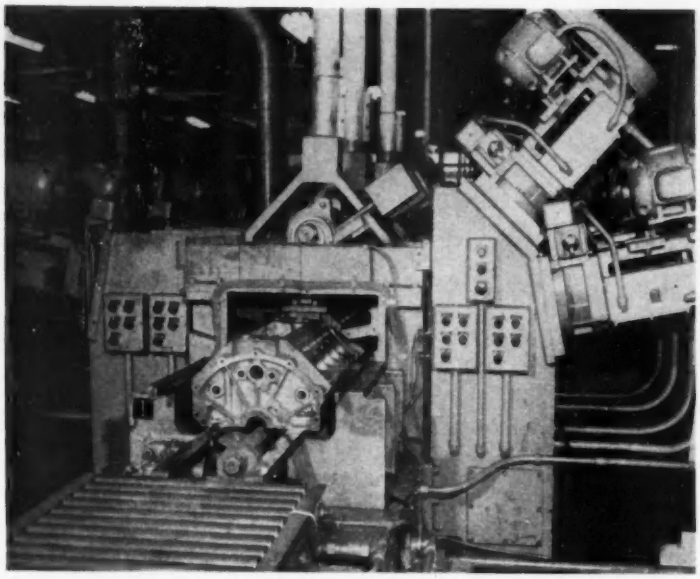
V-8 Overhead Valve Engine

Kruger Barnes drilling machine which was originally made for the Dodge transmission line, and since has been redesigned for use on the cylinder block line.

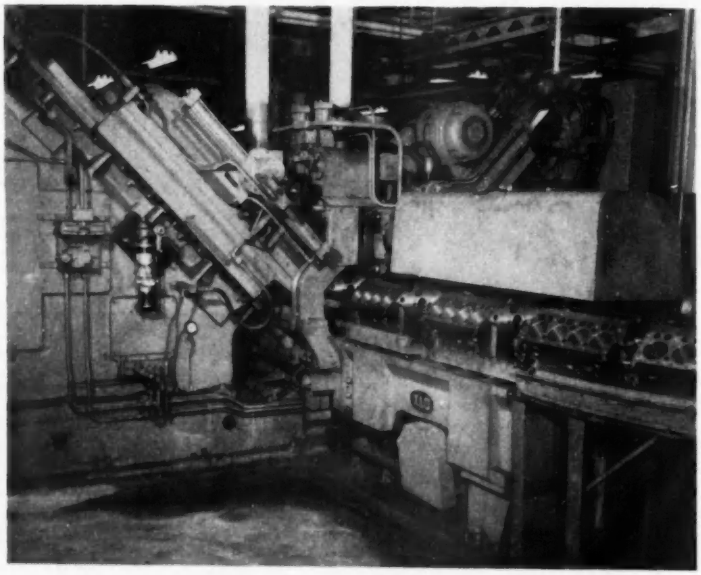


half bore. Automatic turnover equipment is used after the first and second sections of the broaching machine. All of the 1113 tools in the Cincinnati broach are tungsten carbide tipped, with the exception of the finish broaches, which are solid carbide.

In the first section of the Cincinnati unit, the top face of the cylinder block is rough and finished broached and four lugs for transfer and machining purposes also are rough and finished broached. As the part proceeds through the 159 ft long broaching machine, the bottom face of the block and the main bearing half bores are broached, and then the two cylinder head surfaces are rough and finished broached. Gaging stations have been provided



Cross 16 station transfer type horizontal drilling machine which drills several holes and semi-finish reams, finish reams, and wire brushes the 16 valve tappet holes.



The eight cylinders are finish bored on this Ex-Cell-O angular precision boring machine.

at various locations in the machine. It is of interest that the broaches travel at a speed of 200 fpm.

This Cincinnati broach is one of the machines that was built and erected by the Dodge organization. Component parts of the machine were manufactured by vendors from drawings supplied by the Cincinnati Milling Machine Co.

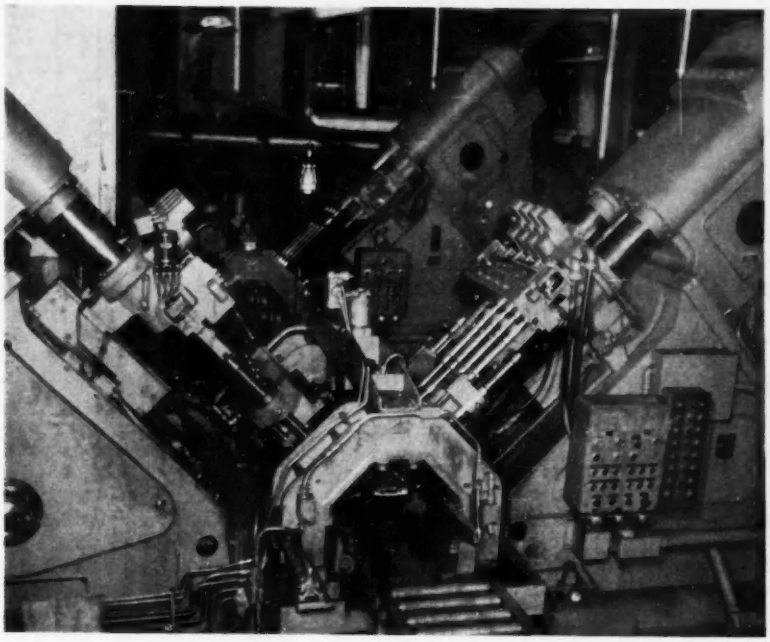
This is followed by a four-station Baker index machine, which performs the following operations: Drill, chamfer and ream (2) 0.7490-0.7505-in. locating holes. Drill and chamfer (4) "F" (0.257 in.) tap drill holes for 5/16-18 tap. Drill and counterbore (10) 27/64 in. holes for ½-13 tap. Drill (1) distributor hole to 7/16 in. and drill (1) ½ in. oil hole in No. 5 bearing in bottom.

A Fitchberg transfer type horizontal duplex milling machine is utilized for the next operation. Here, the front end of the block is rough and finish milled and the rear end of the part is rough and semi-finish milled leaving 1/64 in. stock to be finish milled in assembly.

After the loading the part with the bottom down and the left side leading at the first station, it is located by means of two holes in the bottom of the block. Rough milling is performed on the front and rear ends of the workpiece at the second station. At the third station, the front end of the block is finish milled while the rear end is semi-finish milled. Next, it is unloaded at the fourth station.

In a subsequent metal cutting operation, the block is machined in a Greenlee transfer type horizontal duplex drilling machine. Here, holes are drilled in the top, cylinder head faces, oil filter pad and tappet bosses. This machine has a total of 17 stations including loading, machining, gaging, idle, and unloading. The part is placed in the machine with the bottom face down and the front end leading, at the first station. Location is done by means of two 0.750 in. locating holes.

Machining operations are started at the second station of the Greenlee where a 16-spindle head is used for drilling oil holes ⅛ in. diam in the tappet bosses



The two W. F. & John Barnes honing machines shown here are used to rough and finish hone the cylinders to 3.4375-3.438 in. diameter.

on the left hand side of block. These holes, which have a finished depth of two in., are only drilled part way at this phase. On the right hand side of the second station, an angular drill unit is used for drilling a hole in the oil filter pad.

On the left hand side of the third station, another 16-spindle drill head is brought to play to drill the oil holes in the tappet bosses to proper depth. An angular drill head is utilized on the right hand side to finish the hole in the oil filter pad.

After moving to the fourth station, the block has 10 holes drilled into the left cylinder head face for a 1/3-13 tap. This same operation is also carried out on the right hand side of the block. At the fifth station all of the holes in the cylinder head faces are chamfered.

After an idle station, No. 6, four holes are drilled through the cylinder head faces at 65 deg above the first four tappet holes in both the right and left bank and tappet holes are spot drilled. This same operation, except that holes are drilled above the second four tappet holes, is performed at the eighth station in the Greenlee.

Utilizing 65 deg angular drilling units, 16 holes, ¾ in. diam, are drilled through the tappet bosses at stations 9 and 10. At the eleventh station, the block is automatically rotated 360 deg endwise to remove chips before going through further machining operations. A 12-spindle multiple drill head mounted on a 45 deg angle at station 12 is used for drilling 10 water circulating holes and two oil holes on the left hand side while the 12-spindle right hand head drills nine water holes and three oil holes in the block.

Other oil and water passages are drilled at various locations in the block at stations 13, 14 and 15. All holes in the workpiece are automatically inspected at station 16, and the part is unloaded at the seventeenth.

A Natco transfer type horizontal drilling machine will be installed on the line for drilling, reaming, counterboring, and chamfering operations on the block. Rough core drilling and finish counterboring will be done on the rear camshaft bore in this machine. The front camshaft bore will be rough core drilled. All holes in the front and rear ends of the block will be drilled and chamfered and two dowel holes in both the front and rear ends of the block will be drilled, chamfered, and reamed. Tungsten carbide tools will be used. The machine will have a total of 16 stations.

A Krueger Barnes drilling machine, the unit originally made for the Dodge automatic transmission line and redesigned for use on the engine line, is set up to perform drilling, reaming, tapping, chamfering and boring operations on the cylinder block.

At the first station of the Krueger Barnes unit, the block is loaded with the bottom up and rear end leading; it is located from two 0.750 in. holes. Three Welsh plug holes are counterbored and a drain hole is drilled on each side of the block at station 2. The Welsh plug holes are finished counterbored and the drain holes are reamed and chamfered in the next station.

The left hand head at the fourth station drills a ¼ in. diam hole in No. 5 main bearing halfbore while three holes are drilled in the oil filter pad and one hole in No. 1 mainbearing halfbore by the right hand head. Holes in mainbearing halfbores, which were drilled to 1/3 depth at the station just mentioned, are drilled to 2/3 depth at station 5. Further drilling operations also are performed on the oil filter pad holes at this station. Next, holes in the No. 1 and No. 5 bearing halfbores are finished, station 6, and two holes in the oil filter pad are chamfered while the

(*Turn to page* 110, *please*)

Automotive Advancements *in Plastics*

Timely Technical Discussions Highlight Annual Meeting of Body Engineers in Detroit

By James R. Custer

Physical Properties of Plastic Body Laminate

80% Resin — 20% Glass

ASTM Method No.	Fed. Spec. L-P-406 Method No.	Property and Test Conditions	
....	1031	Ultimate str. flexural, flatwise, psi	20,000
....	1031	Mod. of elasticity, flexural initial, psi	630,000
D638-42T	1011	Ultimate str., tensile, psi	6,500
D638-42T	1011	Mod. of elasticity, tensile, initial, psi	1,200,000
D695-42A	1021 (2)	Ultimate str., compressive, edgewise, psi	22,000
D695-42T	1021 (2)	Mod. of elasticity, compressive, edgewise, initial, psi	740,000
D256-43T	1071	Impact str., edgewise, notched Izod, ft. lbs./in. of notch	9
D570-42	....	Chemical Resistance Properties, gain in weight after 24 hrs. immersion @ 25 C	
		Distilled Water	0.29%
		AN-O-366, oil, Petroleum Base	0.10%
		AN-F-13, Fluid, Anti-icing, Isopropyl Alcohol	0.09%
		AN-E-2, Ethylene glycol, non-corrosive	0.07%
		AN-F-42, Fluid, Hydrocarbon, Std. Test, Type II	0.10%
....	5011	Specific Gravity	1.406
....	....	Resin Content, calculated	80%
....	....	Linear Shrinkage, during normal R. T. cure	0.0015 in./in.
....	....	Additional Linear Shrinkage after long term ageing or elevated temperature postcure	0.0015 in./in.
D696-42T		Coefficient of Linear Expansion (thermal) −20 to +30 C	6.0×10^{-5}
		+30 to +90 C	9.0×10^{-5}

GREATER concentration on the functional application of plastics in the automotive field was evident at the annual technical convention of the American Society of Body Engineers when that organization convened the last three days of October in Detroit. There were several technical papers and displays on the newest plastics developments. As the result of the impressive progress that has been made, automobile manufacturers are reported to be taking much greater interest in the increasing possibilities of plastics for functional uses.

United States Rubber Co., Libby-Owens-Ford Glass Co., and Creative Industries of Detroit had exhibits at which they presented examples of their research and demonstrated new plastic products now in use in passenger cars and in automobile manufacturing plants. U. S. Rubber displayed various body parts, including interior side panels and seat panels, and manufacturing items such as an assembly fixture, piston and connecting rod tote tray, shipping shroud for automatic transmissions, special materials handling tray for jet engine impeller blades, storage trays for automotive parts, and a crankshaft

Physical Properties of Royalite

	Royalite Standard 100 Series	Special Elec. Stock No. 180	Royalite Flame Resist. FR-1100 Series	Leather-like Stock 700 Series
SPECIFIC GRAVITY (ASTM D-792-44T)	1.12	1.08	1.28	1.12
DENSITY (lbs. per cu. ft.)	70.0	68.5	80.0	70.0
SPECIFIC VOLUME	.892	.925	.780	.892
ELONGATION (%) (ASTM D-638-46T)	40	8.0	25	350
TENSILE STRENGTH (psi) (ASTM D-638-46T)	4,000	8,000	3,000	2,000
MODULUS OF ELASTICITY (in tension) (psi) (ASTM D-638-46T)	240,000	375,000	200,000	....
FLEXTURAL STRENGTH MODULUS OF RUPTURE (psi) (ASTM D-650-42T)	6,600	15,000	6,000	....
MODULUS OF ELASTICITY (in flexure) (psi) (ASTM D-747-43T)	200,000	300,000	170,000	....
ROCKWELL HARDNESS ("R" scale) (ASTM D-785-44T)	90	118	75	....
IZOD IMPACT (ft. lbs./inch notch) (ASTM D-256-43T)				
Temp. F 70	9.0	.6	7.0	....
30	4.0	.5	1.0	
20	1.0	.5	.8	
0	.5	.5		
Drop weight test —.125 gage stock must stand 60 ft lb impact to °F indicated.	35°F	....	50°F	....
TABER ABRASION (wt. loss in grams) H-18 wheel, 2000 cycles	.50 gms.	.30	.50 gms.	.20
BURNING RATE (inches per minute) (ASTM D-635-44, .125 ga. material)	2.8	2.5	Self extinguish-ing	3.0
MOISTURE ABSORPTION (ASTM D-570-42)	.35%	.4%	.5%	.5%
%/24 hrs. total immersion				
%/20 days total immersion	2.3%	....	2.5%	....
MOISTURE EXPANSION in/in at 70° F from 0 to 90% R.H.	.0018	.0026	.0020	....
THERMAL EXPANSION in/in/° F (70°—122° F)	4.75×10^{-5}	3.6×10^{-5}	5.5×10^{-5}	....
THERMAL DISTORTION (ASTM D-648-45T)				
°F AT 66 psi		185°	....	....
°F AT 264 psi	160°	179°	153°F	....
THERMAL CONDUCTIVITY Btu/hr/ft² F/in. (Cenco-Fitch Thermocouple)	1.0	1.1	1.0	1.0
SPECIFIC HEAT	.35	.35	.36	....
SHORE "A" HARDNESS	....	....	....	80

General physical properties at room temperature unless otherwise noted.

tray for manufacturing and shipping use.

The foregoing parts were made from Royalite, U. S. Rubber's copolymer thermoplastic of resin and rubber which is marketed in sheets of various thicknesses. It also is used by Creative Industries to make scale models of automotive parts, assemblies, and vehicles for study purposes by company engineering and manufacturing departments. How the Ford Motor Co. is applying this plastics prototype technique was described in the July 1 issue of AUTOMOTIVE INDUSTRIES, page 98. At one of the technical sessions Arnold P. Saviano, supervisor, Plastics Division, Creative Industries of Detroit, delivered an informative paper on plastics prototypes and it was followed by discussions by Wallace A. Stanley, Ford engineer, and Harold B. Wright, U. S. Rubber Co., engineer.

Another plastic series that is making headway fast is the reinforced polyesters composed of glass fibers and the resin. Hoods, fenders, trunk lids and other body parts are reported under development using this reinforced plastic. Libby-Owens-Ford displayed a rear fender made of it, which attracted considerable interest.

Reinforced Plastic Products

Two sports cars with reinforced plastic bodies were exhibited by the Naugatuck Chemical Division, United States Rubber Co., and the Glasspar Co., Santa Ana, Calif., which is making the bodies and to date has turned out over 100 of them. They are being made of two layers of glass fiber mat and two layers of glass fiber cloth combined with polyester resin in the proportion of 80 per cent resin and 20 per cent glass. Each body, including fenders, is molded in one piece and the doors and hood are cut out afterward and hinged. Steps in making the bodies were illustrated in the May 15, 1952, issue of

AUTOMOTIVE INDUSTRIES, page 46. They are being sold at $695.

Dr. Earle S. Ebers, sales manager of the Naugatuck division, which makes the polyester resin for the Glasspar bodies, presented a paper at a technical session giving the details of constructing the bodies, which are now lacquered. Plans are underway to impregnate the plastic with color. He listed a variety of civilian products made of reinforced polyester that are in production. In the military field three experimental amphibious vehicles with reinforced plastic shells have been built and tested. For military aircraft, reinforced polyesters are being used to make radomes and fuel cell supports. AUTOMOTIVE INDUSTRIES plans to publish in an early issue an article on the design of reinforced plastic parts for aircraft.

Dr. Ebers listed the physical properties of the body plastic laminate and explained that they could be improved considerably by increasing the ratio of glass to the resin. Comparing two laminates with different proportions, ultimate tensile strength went from 6500 psi to 40,000 psi and ultimate compressive strength from 22,000 psi to 40,000 psi. He announced that new resins have been developed and new glass pre-treatments are being developed for greater strength. Numa was proposed as the industry name for these new reinforced polyester materials and aid was asked for developing techniques to mold products of them on a volume production basis. Physical properties of the plastic laminate used in the Glasspar bodies are tabulated elsewhere in this article.

During the convention large crowds visited the 29 exhibits of body materials suppliers, consisting of American-Bosch Corp., American Forge and Socket, Ainsworth Mfg. Corp., The Anderson Co., Burlington Mills, Inc., Capital Engineering Reproduction Co., Creative Industries of Detroit, Douglas & Lomason Co., Reliance Division of Eaton Mfg. Co., Engineering Reproduction, Inc., Gits Molding Co., Graham Co., Hurd Lock & Mfg. Co., Libby-Owens-Ford Co., Motors Product Corp., Owens-Corning-Fiberglas Corp., Presstite Engineering Co., Prestole Corp., Progressive Welder Corp., The Randall Co., Redmond Co., Inc., Robin Products Co., Shakeproof, Inc., Soss Mfg. Co., Stubnitz-Green Spring Corp., Tanners Council of America, Tinnerman Products, Inc., Trico Products Corp., United-Carr Fastener Corp., and U. S. Rubber Co.

One came away from the exhibits impressed by the many thousands of different types of fasteners that are made today. Metal and plastic types were exhibited by several fastener manufacturers. Also on display were the latest developments in seat rails using ball bearings, and electrically controlled front seat adjustment. Gits Molding Co. displayed nearly 60 multiple molded plastic parts.

At the technical sessions a variety of timely subjects were discussed in 14 papers. The opening meeting was devoted to sports cars, at which the Nash Healey car was described by E. L. Monson, Nash development engineer. The sports car movement in this country was reviewed by W. W. Wood, general manager of Colonial Bushing, who operates a sports car dealership. He pointed out there is a good market for a sports car midway between the British MG and Jaguar. Marshall Teague, noted stock car driver, related the benefits stock car racing provides for car designers.

In his analysis of the effect of impact loads on passenger car body structures, H. C. Johnson, of the Experimental and Development Section, Fisher Body Engineering, stated that the most critical areas are at the dash to chassis frame brace, and at the body mount near the rear axle, which necessitates that special attention be given to the design of body structural members at those points so they can withstand the impact loads. Consideration of the following other design factors, he said, may produce an improved condition:

(1) Rubber shims between the body and frame to dampen the impact. Very soft shims, however, will affect torsional rigidity, which affects ride performance. (2) Extension of the dash to chassis frame brace, attaching it to the frame forward of the dash. (3) Attachment of a horizontal reinforcement between the vertical leg of the dash to chassis brace and the bottom of the toe pan. (4) Strengthening of the chassis frame by the welding of sheet metal strips to the lower surface of the frame between the dash and rear pillar locations. (5) Elimination of body bolts between front and rear pillars. (6) Stiffening of spring suspensions to reduce the effects of impact loads without seriously affecting ride characteristics. (7) Reinforcement of the body mount near the rear axle.

Cost Engineering

E. W. Rothaar, master mechanic of the Briggs Manufacturing Co., outlined the basic considerations given to body cost estimating by Briggs. In the Estimating Department the major divisions are:

(A) Estimating engineering and preliminary processing.
(B) Estimating of all tools, such as dies, jigs, fixtures, models, etc.
(C) Job estimating, including material, labor and other factors.
(D) Estimating of engineering changes, including planning of changes.
(E) Equipment planning and estimating, steel conservation.

When a new job is being contemplated for which a cost estimate must be prepared, a roundtable discussion is held, attended by the supervisors of these divisions and representatives of tooling, plant engineering and manufacturing divisions. Total overall production requirements, daily and hourly quantities, type of tooling, manufacturing space and any other information helpful in estimating are discussed

(Turn to page 96, please)

News of the MACHINERY INDUSTRIES

By Thomas Mac New

Huge Forging Presses Discussed at Dayton, Ohio, Chapter of the ASTE. E. W. Bliss Co. Building Two Giant Presses.

Heavy Forging Press Program

Last month the Dayton, Ohio, chapter of the American Society of Tool Engineers held an extremely interesting meeting on the heavy forging press program of the Air Materiel Command. Speakers at the technical session included E. A. Irwin, general sales manager, E. W. Bliss Co., Col. Wilbur R. Carter, U. S. Air Force, and R. F. Moore, plant manager of the Newark Heavy Forging Press Plant.

Col. Carter discussed the origin of the heavy press program and the current status of the program. He stated that 17 huge forging presses were on order and that the cost of the entire program, including new plants, would be approximately $400 million. According to the colonel, the military is primarily concerned with the weight savings that can be obtained by use of the forging presses on light metals. It was also mentioned that there would be a great manpower saving in time of national emergency in respect to a fabricated part versus the forged aircraft part.

Comments from Bliss Co.

Mr. Irwin gave some facts and figures on the 35,000 and 25,000 ton presses being built by the E. W. Bliss Co. for the new Air Force Plant at Newark, Ohio, which is currently being constructed. He stated that the major parts of the 35,000 press are the crown, base and cylinder container, which are held together by eight tie rods. An outside rod used in each corner is a push-back cylinder. Altogether, the press stands 72 ft from top to bottom. Total weight of the press will be about 12 million lb or 6000 tons. Die area available is 24 ft by 12 ft. Maximum daylight opening—the up and down distance from the bolster plate to the bottom of the crown—is 11 ft. Stroke of the slide is five ft. Approach and return speeds are 300 ipm and main ram capacity can also be controlled anywhere from 7000 tons to the maximum 35,000 tons, utilizing all the eight main cylinders of the press for all pressures. Stripping capacity amounts to over 2000 tons. The weights of the moving parts of the press are 3400 tons and the total force needed to lift these

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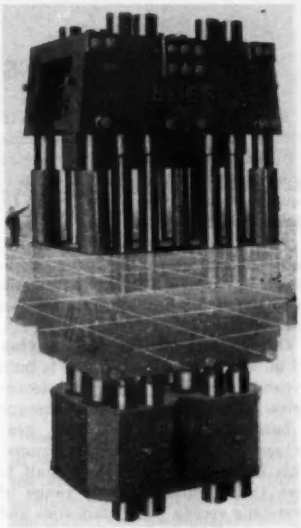
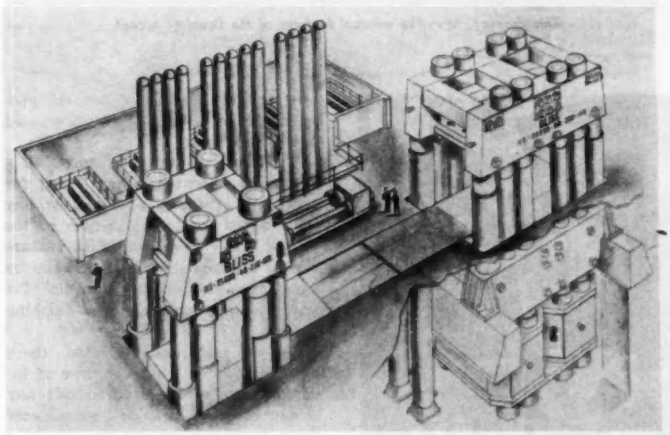


This is an artist's conception of the appearance of the 35,000 ton Bliss closed-die forging press that is being installed at the new Air Force Plant in Newark, Ohio. This press stands 72 ft from top to bottom with 33 ft above the floor level. It weighs 12 million lb and has die area 24 ft by 12 ft by 11 ft high.



An artist's conception of the general arrangement of the E. W. Bliss Company's 35,000 ton and 25,000 ton capacity presses as they will be installed at the new Air Force Plant at Newark, Ohio. In the foreground are two large presses, with the floor around the 35,000 ton press cut away to show the portion of it that is located below floor level. The two vertical tanks to the left of the bottom of the 35,000 ton press are the water bottles from which water is furnished to the main cylinders of the press at up to 5400 psi. Between the two presses is a runway for sliding tables from either of the two presses. These tables are used to assist in placing dies within the press and in inserting the auxiliary 2500 ton capacity horizontal press in the die space at either of the large presses. This press is shown slightly in back of the center of this runway, where it will be located when not in use. The 13 high bottles in the background conttain air at 5400 psi. Behind the air bottles are the six pumps, each with a capacity of 500 gpm.

NEW EQUIPMENT PLANT • PRODUCTION

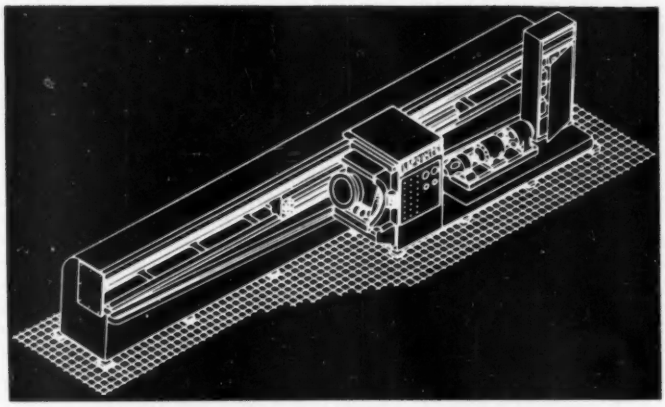
FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 81

High-Speed Horizontal Broaching Machine

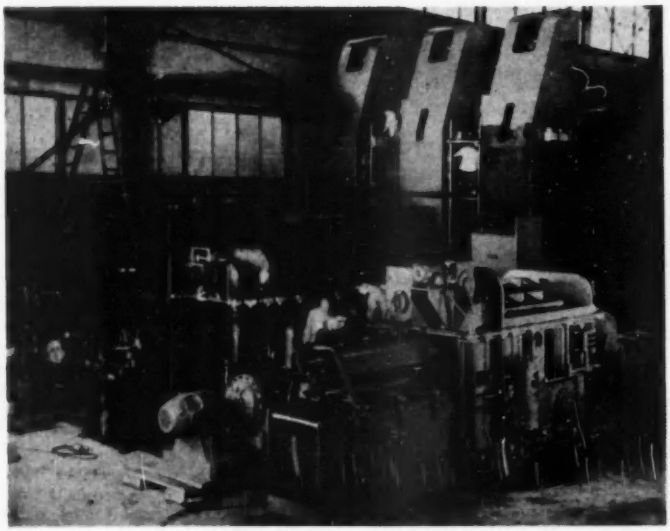
Now available is a mechanically-driven horizontal broaching machine. This unit is said to have a broaching speed of 150 fpm or more. It can be equipped with drives up to 200 hp for high-speed broaching.

With this machine it is claimed to be possible to utilize the best speed at which to cut new alloys to obtain the desired finish, with the greatest tool life.

Offered with strokes ranging from 66 in. to 200 in., this machine is built around a special type of electric drive. The driving means is through a herringbone rack, bull gear, gear reducer and direct current motor. This is fed by its own power unit to give the machine its wide range of broaching speeds. The main slide and all other sliding members subject to scoring are lined with natural phenolic plates sliding on heat treated meehanite ways.



This drawing shows the external features of the Lapointe broach.



Lapointe electric drive broaching machine being assembled.

The machine has dual speed as a means to operate at any speed for any part of the stroke, and at any other speed for the remainder of the stroke when required. This feature can be accomplished automatically by simultaneously setting the dial for any roughing speed and any finishing speed.

On its reciprocating table, there can be mounted whatever type of indexing may be required to suit any size or shape of disks and wheels now being made for jet engines. A table similar to the Lapointe Tip-down table has been furnished for broaching jet blades. The power required to operate the clamping fixture is hydraulic. Suitable hydraulic units are built within the base of the machine, but the actual operation of the main work slide is done mechanically. *Lapointe Machine Tool Co.*

Circle E-1 on page 81 for more data

Transfer Machine for Main Bearing Caps

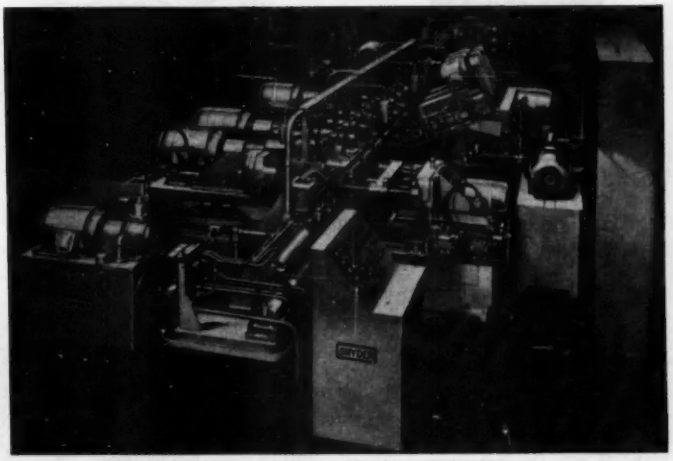
A 19-station automatic transfer machine for processing main bearing caps in clusters and delivering individual work-pieces, sawed apart and automatically sorted at the rate of 96 pieces an hour at 80 per cent efficiency has been produced.

The workpiece, as it enters the machine at the loading station, is a main bearing cap cluster for a V-8 engine and the processing consists of drilling, reaming, spotfacing, tapping holes, milling anchor slots, sawing the cluster into individual caps and sorting the finished parts.

Clamping is hydraulic and the fixture is moved throughout the 19 stations by means of a hydraulic operated transfer bar. Control is automatic but may be switched to manual if desired. Tools are carbide and high speed operating at a speed of 80 sfpm for drills, and 200 sfpm for the facing head. Feed speeds and strokes vary to suit the individual application. The work cycle is 30 sec.

Standard units are used throughout and all heads are motor driven through gears which can be changed to give different tool speeds.

The entire operation is automatic and is protected by electrical interlocks. Lubrication is automatic. *Snyder Tool & Engineering Co.*



Snyder 19 station transfer machine for main bearing caps.

Circle E-2 on page 81 for more data

Versatile Gear Shapers

An improved Series 1800 line of Shear-Speed gear shapers has been announced. Twelve new design features are said to provide improved performance, reduce tool change time, and facilitate machine maintenance. A new Model 18105 with a five-in. cutter head stroke replaces the former Model 18103 which had a three in. maximum stroke.

The Series 1800 line now includes four models: 1833, 1853, 1873, and 18105. These models have capacities ranging from one. in. diam to 10-in. diam gears with maximum face widths ranging from 2¾ in. to 4½ in. The line is designed for cutting of spur gears, involute, angular, straight-sided and inverted splines, sliding clutches, toothed parts, ratchets and special forms. Michigan Tool Corp.

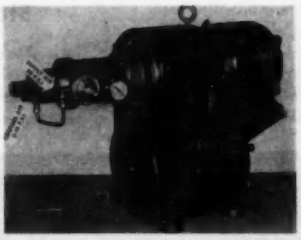
Circle E-3 on page 81 for more data

Control Unit

Now available on all integral horsepower Reeves Vari-Speed Motodrives for use in conjunction with instrumentation air pressure of three to 15 psi, is the Conoflow control.

Addition of the Conoflow control is claimed to permit the Motodrives to control liquid levels in tanks, whether of the open or enclosed types. In addition, the Conoflow control makes it possible to use the Motodrive for automatically controlling flow proportioning systems, as well as pressure and temperature.

Connection is made direct to the Conoflow cylinder on the drive from a pneumatic controller. The cylinder is pre-lubricated. *Reeves Pulley Co.*



Reeves control unit, the Conoflow.

Circle E-4 on page 81 for more data

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NEW EQUIPMENT PLANT • PRODUCTION

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(*Continued from page 75*)

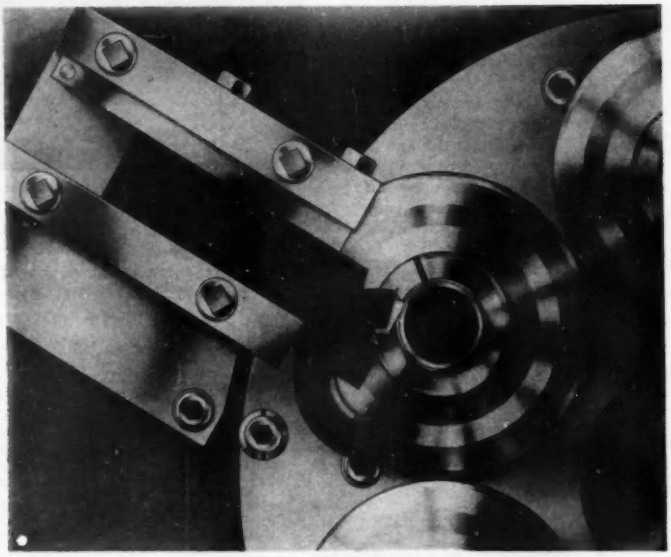
Circular Cut-Off Tool

A circular cut-off tool based on a different concept of tool design is now being offered to the metalworking trade. The tool fundamentally is a semi-circular disk of high speed steel, with the cutting surface in the periphery, as illustrated.

The blade is mounted in a holder with all but the necessary cutting edge protected by an envelope or shroud. The tool is so ground that when the cutting edge of the tool is in the same plane as the front of the holder, it is properly positioned. The tool holder is located in the machine so that the cutting edge of the tool is in the spindle center line. The present holder can be substituted for the conventional straight blade holder in most screw machines up to 1⅝-in. capacity.

Periphery of the tool is hollow ground to collapse the chip and lessen heat generation from chip flow on the edges of the tool. Side clearances are ground in the blade during manufacture and remain constant throughout the life of the blade. The front clearance angle is ground in the blade prior to shipment and to facilitate grinding guide lines are stamped on the sides of the blades. Top rake is constant—being built into the tool as it is resharpened. Control of chip during the cut is maintained by grinding the shroud, not the tool edge. *Cir-Cut Div., New Britain Machine Co.*

Circle E-5 on page 81 for more data

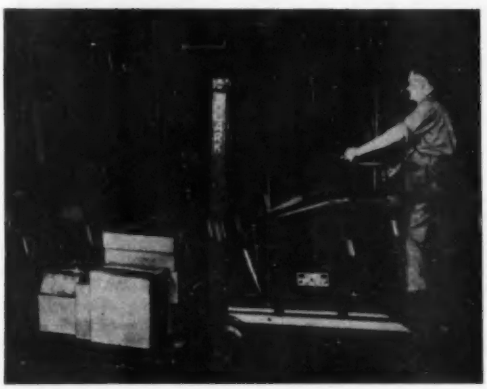


New Britain circular cut-off tool.

Stand-Up Fork Truck for Narrow Aisles

An electric "stand-up" fork truck, the Stoway, which can operate within its own length, has just been brought out. The Stoway is designed for close quarters and narrow aisles. It has a capacity of 2000 lb at 24 in., 2500 lb at 15 in., and 1650 lb at 30 in.

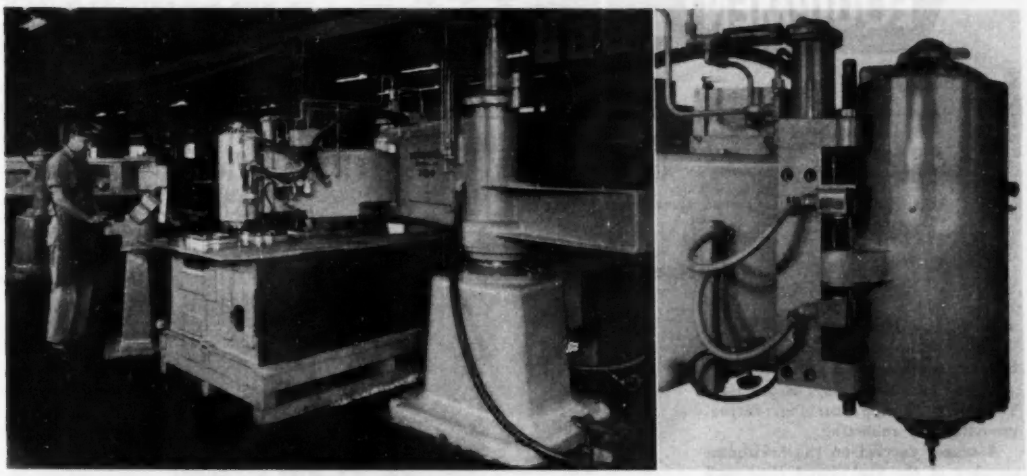
Driver comfort, easy "off-and-on" access, convenience of controls and excellent visability are features claimed for the Stoway. Acceleration and direction of travel are controlled through forward or backward movement of a single lever. Lift and tilt controls are grouped to the right of the acceleration-travel-control lever to simplify hand movements. The rubber-cushioned floor board contributes to driver comfort.



Clark stand-up fork truck.

The Stoway features two methods of braking. Heavy-duty hydraulic service brakes on the drive wheels serve regular and parking-brake operations. "Deadman" or parking brakes go into action when the driver dismounts. Positive-control reverse, "torque-braking," which occurs when the travel control lever is reversed, is employed in the Stoway. *Clark Equipment Co.*

Circle E-6 on page 81 for more data



The Ekstrom, Carlson single radial arm router is shown at the left while the retractable head with both follower and spiral flute cutter in operating position is illustrated at the right.

Power Operated Single Radial Arm Router

Recently designed and put on the market is a machine for high speed routing and certain types of milling operations in non-ferrous metals. It consists of a base, main turret, two hydraulic power operated arm sections, a router head, a remote control station, the complete hydraulic panel and the electrical panel. The router head operates on high cycle current.

Inner and outer arm sections are box-type design and are made of cast semi-steel. These arms operate on Timken tapered roller bearings with provision for take up. Feeding power is applied to each of these two arm sections by means of a hydraulic cylinder, rack and pinion. The cylinders and racks are integral with the arms and the pinions are integral with the posts. Arm sections are equipped with magnetic electric brakes. These brakes, during normal operation, are energized with a low voltage current to assure the maximum smoothness of feed. When the cutter is plunged into the work or when the arms otherwise are brought to rest, the voltage to the brakes is automatically increased to the maximum holding capacity and the arms are rigidly held.

As standard, the machine is equipped with a single winding 30 hp air-cooled motor for operation on three phase, 440 v, 240 cycle to provide a spindle speed of 14,400 rpm. The head is equipped with a draw bar type collet having a maximum capacity of ¾ in. diam straight shanks.

The motor can also be operated on 120 cycle which would then provide a spindle speed of 7200 rpm, and deliver 15 hp.

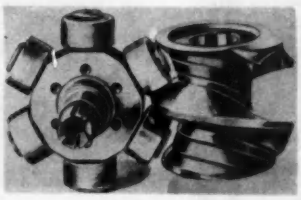
The head is equipped with a removable cast member to receive the replaceable non-rotating pattern followers. The pattern follower is so designed that the cutter coolant is directed to the cutter as a mist, completely enveloping the cutter. The supply of coolant to the cutter is solenoid controlled. The solenoid valve is electrical interlocked with the stop and start button controlling the head. When the spindle is stopped the supply of coolant is shut off. The coolant is pre-mixed with air prior to reaching the cutter. The standard set back of offset between the template or router block and the edge of the material when cutting is 7/32 in. *Ekstrom, Carlson & Co.*

Circle E-7 on page 81 for more data

High Speed Roller Gear Drive

Now in production is a high-speed roller gear drive.

This drive is said to permit precision, design versatility and low maintenance on any applications such as indexing dials, indexing carriers, indexing conveyors and indexing mechanisms. It can be used on dials and roll feeds, carrier chains and conveyors at speeds up to 800 pieces per minute to extremely close tolerances and without auxiliary locating mechanisms, according to the maker. *Ferguson Machine & Tool Co.*



Ferguson roller gear drive.

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NEW EQUIPMENT PLANT • PRODUCTION

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(Continued from page 77)

are operated by large hydraulic cylinders. The vertical slide provides feeds for turning, boring and rabbeting, while such operations as facing and grooving are done during the feed stroke of the horizontal slide. Seven different automatic cycles are possible with the left-hand compound slide.

The normal machine cycle includes operation of both compound slides in sequence, either operating first. All slideways are hardened and ground steel and are lubricated automatically. *Ex-Cell-O Corp.*

Circle E-9 on page 81 for more data

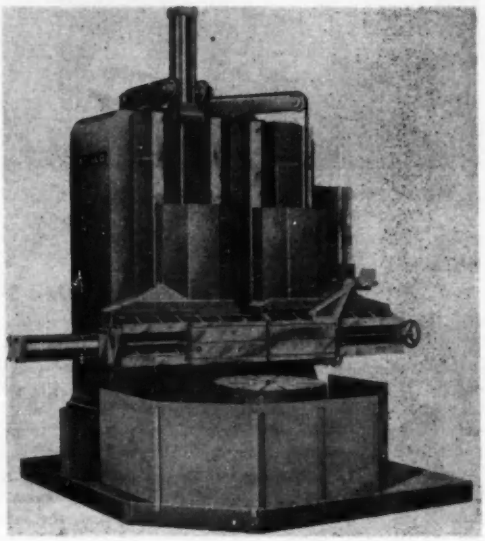
Vertical Precision Contouring Machine

For machining large round parts such as jet engine compressor wheels, the Style 426-A vertical precision contouring machine was designed. It performs such operations as precision contouring, boring, turning, facing, grooving and rabbeting.

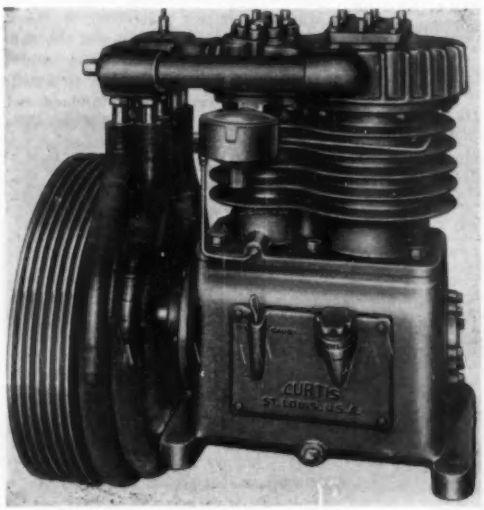
A tracer carried on the horizontal member of the right-hand compound slide controls both vertical and horizontal movements in contouring operations. The tracer finger follows the form on a hardened and ground flat steel template.

Both vertical and horizontal members of the contouring slide are operated through ground lead screws driven by individual variable speed motors. Through the electronic control, the adjusted feed per revolution remains constant throughout the cut regardless of variations in the contour or table speed.

The left-hand compound slide consists of a vertical slide supporting a horizontal tool slide, both of which



Ex-Cell-O vertical precision boring machine.



Curtis air compressor.

Air-Cooled Air Compressor

Recently announced were a 15 and 20 hp, two-stage, air cooled air compressor. It has a 7½ in. by 5 in. low pressure and a 4 3/15 in by 5 in. high pressure cylinder. Piston displacements range from 78 to 92 cfm at pressures of from 100 to 175 lb with the 15 hp motor, and 108 cfm at 100 to 125 lb with the 20 hp motor.

Through the use of cushioned annular type dish valves and a four-section intercooler, high efficiency is claimed to be obtained in actual air delivered per minute, per horsepower, and per kilowatt hour.

The bare compressor is designated by Model 98. It is also available in base mounted units with or without motor, separate air tank, and with constant running, automatic start and stop, or dual controls. *Curtis Pneumatic Machinery Div.*

Circle E-10 on page 81 for more data

Drilling and Tapping Machine for Jet Engines

Development of a five-way drilling machine for jet engine housings has been announced. This machine features interchangeable multiple drill heads on two of the five stations which enables the production of several types of housings having a variety of bolt circle specifications on faces with identical radial locations.

Loading, clamping and indexing of the housings in the fixture is done manually to meet the requirements of producing a precise part in relatively low production with minimum scrap.

In operation, the aluminum alloy jet engine housings are loaded in the fixture where they are located by an OD ring and a pin in a bolt hole. The fixture is rotated clockwise by hand to positions where individual hold-down clamps can be tightened.

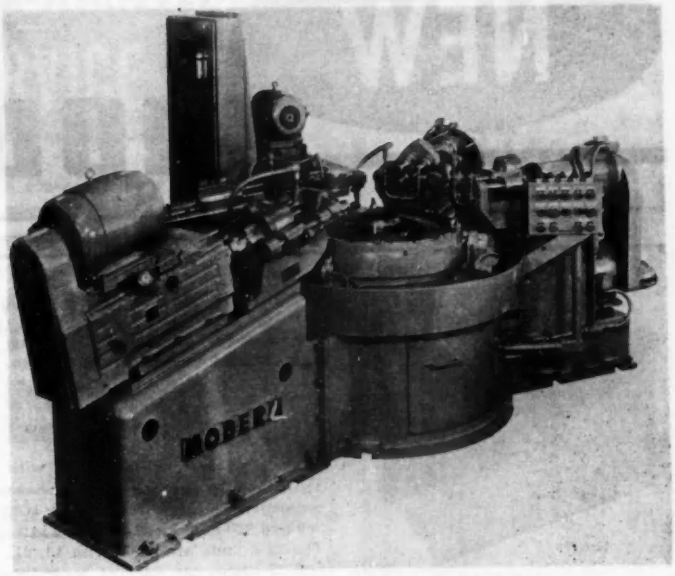
After clamping, the fixture is brought to starting position and the index lever operated to lock the fixture in place. With the actuation of the index lever, three air operated index table hold-down clamps are also applied. By pushing the reset button, a counter and circuit for predetermined automatic selection of head combinations are then set.

Indexing between operations is done manually by rotating the table after the index pin and clamping cylinders have been automatically released by the return stroke of the heads. The table is designed so that it can be indexed in a clockwise direction only and cannot be indexed past successive stations.

The index pin is again pushed into operating position after indexing and the table clamps energized. The cycle start button is next operated and the correct heads begin to feed. Eight stations and nine operations complete the multiple drilling and multiple tapping of holes in the housing.

At the end of the cycle of operations, the fixture is free to be rotated for unclamping the part and unloading it. If tool breakage does occur at any point in the cycle of operations, a manual-automatic switch can be operated and the head can be jogged through successive positions without the heads feeding. An emergency return button is provided to return all heads to idle position.

The machine is powered by three and five hp motors. It is 15 ft wide, eight ft deep and 5½ ft high, weighing 28,000 lb. *Modern Industrial Engineering Co.*



Modern Industrial five-way drilling and tapping machine.

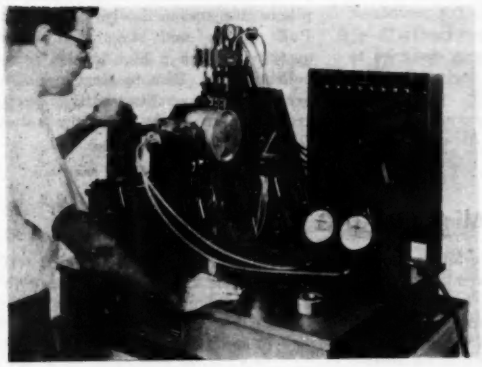
Circle E-11 on page 81 for more data

Positive Operating I.O.-O.D. Piston Gage

A positive-operating multi-dimension gage to measure all critical diameters of automotive and aircraft pistons in two operations has been announced by Federal Products Corp.

With the dual-measuring air plug in a vertical position the operator loads the piston and checks both ends of the piston pin hole for I.D., taper and bellmouth. The air plug is then rotated 180 deg to explore for out-of-round and other undesirable hole conditions. The slightest variation from a master setting is immediately noted by a Dual Dimensionair.

As the gage handle is pushed forward, the piston takes a horizontal position between the contacts. Here all O.D.'s are simultaneously inspected for out-of-tolerance by eight floating gage units and off dimensions are shown on the panel. Red lights show oversize; amber, undersize. These floating units are new style Federal Electricators which are said to be sensitive to the slightest O.D. variation. *Federal Products Corp.*



Federal piston gage.

Circle E-12 on page 81 for more data

NEW PRODUCTS

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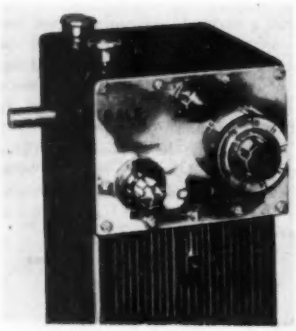
Heavy-Duty Six-v and 12-v Batteries

Said to be designed for starting, lighting, and ignition service on gasoline and Diesel-powered trucks and off-the-highway equipment, a line of batteries is available in both six-v and 12-v units.

The six-v batteries are made with 21, 25, and 41 plates per cell and have respective capacity ratings of 168, 200 and 336 amp hr at the 20-hr rate. The 12-v units are made with 13, 21, and 25 plates per cell and capacities of 100, 168 and 200 amp hr, respectively, at the 20-hr rate.

Features of the XF line include new grid alloy; active material; combination separators and retainers; and containers and covers designed for ruggedness and safety. An electrolyte of 1.260 specific gravity is used. *Automotive Replacement Sales Div., The Electric Storage Battery Co.*

Circle P-5 on page 81 for more data



Hydraulic Governor for Diesel Engines

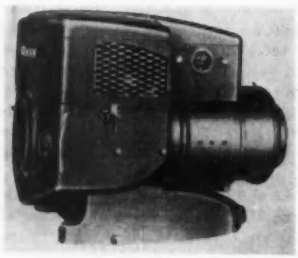
Now available is a hydraulic governor for universal application to all types of Diesel engines. Conventional governor principles are said to be augmented by new features.

Five readily accessible adjustments reportedly eliminate the necessity of changing parts to adapt the unit to the particular requirements of an engine. A self-contained oil supply and a new system of by-pass porting, and subsequent elimination of accumulators, avoids pressure exhaustion and governs under all speeds and loads.

The outer case is of finned aluminum construction for more rapid heat dissipation. A novel linkage arrangement using expansion differentials is incorporated to provide for loss of speeder spring force due to temperature rise. Temperature changes are adjusted automatically.

Two needle valves provide adjustment of recovery time on acceleration and deceleration. *Dale Hydraulic Controls, Inc.*

Circle P-6 on page 81 for more data



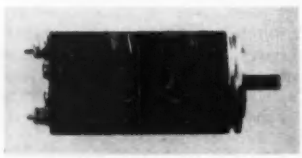
Electric Generating Plant

Recently announced is an a-c electric generating plant with a 4000-w peak overload capacity for periods of up to two hours of operation.

Model 305CK has been designed to meet the demand for higher capacity in small-sized electric plants. The 115-v, 60-c unit is powered by the "CK," two-cyl, four-c, air-cooled gasoline engine.

The plant is available in manual or remote starting models. Manual plants are equipped with the Readi-Pull starter and start easily and quickly through a high-tension magneto ignition. Remote starting units are electrically cranked with the generator acting as the cranking motor. *D. W. Onan & Sons, Inc.*

Circle P-7 on page 81 for more data



Miniature D-C Generator

Similar to the "Moto-Mite" permanent magnet motor, a miniature d-c signed generator has been designed specifically for generator applications to provide units of high voltage output per unit of speed. "Slot-lock" effect and inherent friction are reduced to obtain minimum starting torque.

Circle P-8 on page 81 for more data
(*Turn to page* 142, *please*)

Free INFORMATION SERVICE

Postage-Free Postcards Are Provided Here for Your Convenience to Obtain FREE LITERATURE and Additional Information on NEW PRODUCTION AND PLANT EQUIPMENT, AND NEW PRODUCTS Described in This Issue of AUTOMOTIVE INDUSTRIES. Please Circle Code Numbers of items in Which You Are Interested, Print Name, etc., and Mail Promptly for Quicker Service.

USE THIS POSTCARD

FREE LITERATURE

Precision Instruments

Catalog No. 1520 contains factual information on ElectroniK non-control precision instruments. Detailed specifications for each model are presented. *Brown Instruments Div., Minneapolis-Honeywell Regulator Co.*

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Package Marker

Recently released is a folder on the Markocoder machine for synchronized in-line imprinting of any package form on any package surface. A variety of models is available for use in marking numerous locations on packages. *Adolph Gottscho, Inc.*

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Framing Material

Consisting of a channel frame, spring T-bolt, and safe-locking fittings, Mult-A-Frame is said to enable quick construction of any type framing, supporting, and hanging equipment. *Ainsworth Manufacturing Corp.*

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Detergents

Recently made available is a handy booklet on solvent detergents for removing carbon, grease, dirt, and paint. Applications and methods of use are included. *Oakite Products, Inc.*

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Surge Damping Controls

Bulletin No. VS-1-A covers industrial and aircraft models of hydraulic surge damping valves. They are designed to prevent damaging shock impulses created by sudden starting or reversing direction of flow, or the abrupt release of high pressure into a low pressure area. *The Denison Engineering Co.*

Circle L-5 on postcard for free copy

Furnaces, Ovens, Dryers

Booklet No. 127 describes a broad line of industrial furnaces, ovens, and dryers. The manufacturer's facilities for supplying special automatic machines and integrated production lines are also included. *Continental Industrial Engineers, Inc.*

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Air Cylinders

Catalog Section No. 55 covers a line of air cylinders. Specifications are furnished for each type. *Rivett Lathe & Grinder, Inc.*

Circle L-7 on postcard for free copy

Presses

Now available is a bulletin (No. 11.1) on a line of hydraulic Bulldozers. These forming and bending presses are for hot and cold bending and forming operations. *Lake Erie Engineering Corp.*

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L-2	L-8	L-14	L-20	E-2	E-8	E-14	E-20	P-2	P-8	P-14	P-20	P-26
L-3	L-9	L-15	L-21	E-3	E-9	E-15	E-21	P-3	P-9	P-15	P-21	P-27
L-4	L-10	L-16	L-22	E-4	E-10	E-16	E-22	P-4	P-10	P-16	P-22	P-28
L-5	L-11	L-17	L-23	E-5	E-11	E-17	E-23	P-5	P-11	P-17	P-23	P-29
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Testing Services

Bulletin No. 50-115 describes a variety of commercial testing services available using the ultrasonic Reflectoscope and Reflectogage. Among them is inspection of materials, cast, forged, and machined parts. *Sperry Products, Inc.*

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Lacquers

Now available in folder form is a handy guide to specification lacquers for finishing military items. *Hercules Powder Co.*

Circle L-10 on postcard for free copy

Brazing Alloys

Bulletin No. 20 covers Easy-Flo and Sil-Fos low temperature silver brazing alloys and fluxes. Their properties and applications are detailed. *Handy & Harman.*

Circle L-11 on postcard for free copy

Motor Tester

Fresh off the press is a brochure describing a newly designed Master Motor Tester for completely testing all six and 12-v automotive engines. *Sun Electric Corp.*

Circle L-12 on postcard for free copy

Washers

Now available is a brochure which lists full data on a broad line of lock and flat washers specifically manufactured to meet Armed Forces specifications. *George K. Garrett Co., Inc.*

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USE THIS POSTCARD

Double-End Press

Bulletin No. 219 describes features of a double-end horizontal hydraulic press. *Clearing Machine Corp.*

Circle L-14 on postcard for free copy

Materials Handling

Recently released is a booklet entitled "How to Catch Man-Hour Thieves," which describes how inefficient materials handling severely handicaps successful production. Corrective steps are suggested. *Towmotor Corp.*

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Aluminum Alloy

Now available in booklet form is a complete summary of the physical properties and applications of 40-E aluminum alloy. *Frontier Bronze Corp.*

Circle L-16 on postcard for free copy

Tool Uses

Fresh off the press is a 63-page booklet (No. 352) containing numerous illustrated suggestions for shortcuts with hydraulic and hand tools in many industrial fields. Requests should be made on company letterheads. *Blackhawk Mfg. Co., Milwaukee 1, Wis.*

Chucking and Turning Machine

Bulletin No. 123 describes the 5 D 2-9 in., 2-12 in., and 2-15 in. Powerflex manufacturing automatic chucking and turning machine. Design diagrams and other data are included. *Potter & Johnston Co.*

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Lock Nuts

Bulletin No. 577 describes a line of regular type lock nuts used for severe vibration and heavy assemblies. Typical applications are covered. *The Palnut Co.*

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Tin Facts

Now available is an information booklet describing Malayan tin production, its use in the U. S., and its industrial importance. *The Malayan Tin Bureau.*

Circle L-19 on postcard for free copy

Sand Control

Recently published is a 32-page booklet entitled "Taking the Mystery out of Foundry Sand Control." It covers the selection of molding and core sands, the various physical properties, and their control. *Claud S. Gordon Co.*

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(*See preceding page*)

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L-4	L-10	L-16	L-22	E-4	E-10	E-16	E-22	P-4	P-10	P-16	P-22	P-28
L-5	L-11	L-17	L-23	E-5	E-11	E-17	E-23	P-5	P-11	P-17	P-23	P-29
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EXHAUST TURBINE DRIVEN SUPERCHARGERS for engines from **70 to 500** HP, naturally aspirated output.

POSITIVE DISPLACEMENT SUPERCHARGERS for engine sizes from 50 to 500 HP, naturally aspirated output, and pressure ratios of 2:1 max.

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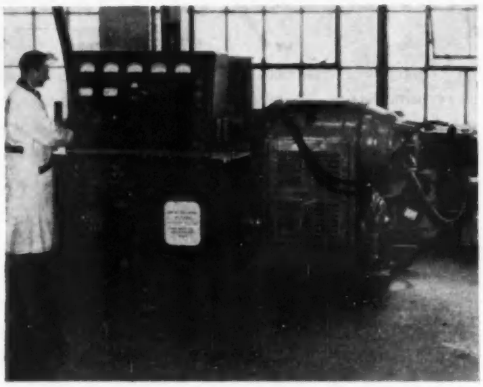
NEW AIRCRAFT PRODUCTS

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 81



Sun generator test bench.

Generator Test Bench

Model AGT, aircraft generator test bench, is made to Air Force Spec. MIL-T-6333. It is said to make fast, accurate tests of 28 v to 120 v d-c and up to 115 v a-c aircraft electrical systems.

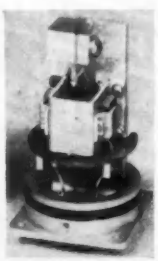
Its variable speed drive is driven by an electric motor and terminates in two drive pads at the right end of the test stand. The high speed pad has a speed range of 3000 to 11,600 rpm and is rated at 50 hp for continuous duty operation and 70 hp for intermittent duty. The speed range of the low speed head is 2350 to 9000 rpm. It is rated at 70 hp for continuous duty operation.

A table at one end of the frame assembly has removable sides for servicing the blower assembly mounted inside. The instrument control unit and the loading unit are mounted on top of the table. *Sun Electric Corp.*

Circle P-1 on page 81 for more data

Synchronous Vibrators

Two 400-c synchronous vibrators, designed to convert d-c signals to a-c for aircraft control purposes, can also be used as rectifiers. One, Model WG178A, is designed for a supply voltage of 115 v, 400 cps, while the other, Model WG178B, takes 12.6 v, 400 cps. Power consumption is .7 and .25 w, respectively.



Honeywell synchronous vibrator.

The vibrators require a 400 cps power supply to drive two separate reed-actuated single-pole-single-throw switches which alternately interrupt the separate circuits in which they are connected. Resulting square wave outputs are 180 deg out-of-phase and are symmetrical within five per cent.

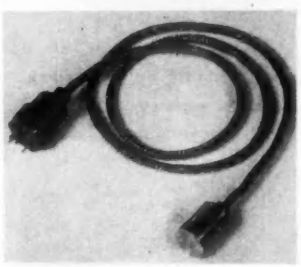
The mechanism is mounted on a square base. Height above mounting flange is 3⅝ in. and diameter of the case is 2 1/16 in. *Aeronautical Div., Minneapolis-Honeywell Regulator Co.*

Circle P-2 on page 81 for more data

Pressure Transducer

Pressure measurements ranging from theoretical investigations of aircraft turbulence-distribution patterns to practical surveys of hydraulic-system and pipeline pulsations are said to be simplified by a miniature pressure transducer recently announced.

Reportedly one of the smallest instruments of its kind ever designed for quantity production, Type 4-310 "Star" pickup measures only ½ in. in diameter and less than ¾ in. in length. Its flush diaphragm is designed for insertion directly into a process vessel or stream of either liquid or gas for test and monitoring purposes.



Consolidated pressure transducer.

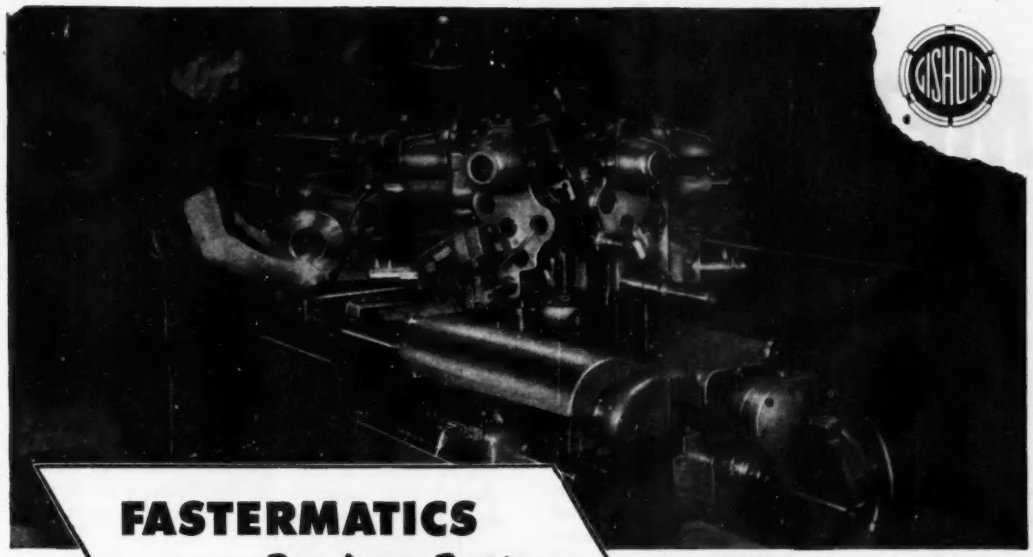
In missile testing and wind-tunnel model applications, its small size and light weight (20 oz) are claimed to make possible direct instrumentation to an unusual degree. The unit may be used with recorders for permanent test records or with visual indicators and meters for on-the-spot measurements. *Consolidated Engineering Corp.*

Circle P-3 on page 81 for more data

Oil-Resistant Seals

Special oil-resistant rubber seals have been developed to prevent oil leakage from aircraft propeller oil control assemblies. The two seals made of Goodrich Hycar rubber are each 6½ in. ID., molded onto a metal base. *National Motor Bearing Co.*

Circle P-4 on page 81 for more data



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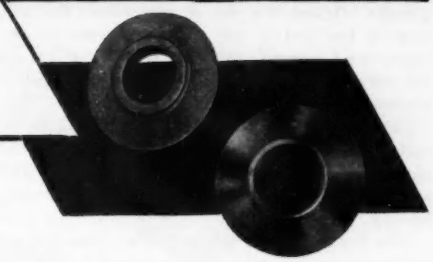
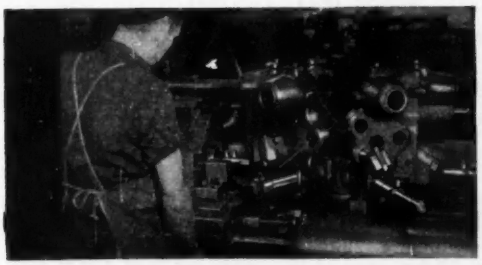


It may seem incredible, in this day and age, for any major machine tool to "buy" itself in nine short weeks of operation. But that's exactly what the Fastermatic Automatic Turret Lathe did on this job of machining clutch plate hubs.

Former time, on hand-operated turret lathes, was 15 minutes per piece. The Fastermatic, with automatic control of all machine functions, reduced the time to only 3 minutes, floor to floor.

Earnings piled up so fast over former production costs that the Fastermatic paid for itself in just 9 weeks—or 893 hours of operation.

Do you have work that permits a number of cuts in one chucking? Investigate the Fastermatics. You may have a big opportunity to increase production, cut costs and save man power.



In this tooling setup, only 3 turret faces are needed to turn each part. With duplicate tooling on the remaining 3 faces of the hexagon turret, 2 parts are machined with each complete turret cycle. The operator merely loads and unloads the work.

THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*

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METALS

Large Increase in European Steel Production. Price of Lead Advances. Better Demand for High Grade Zinc.

By William F. Boericke

Plenty of Steel in '53?

The steel outlook is for over-capacity operations for the balance of 1952 and extending through the first quarter of 1953. Beyond this date the future is uncertain. Some trade executives believe that good, but not capacity business will carry through the second quarter. Others are not so sanguine. But all agree that by the end of the second quarter at any rate, supply and demand for steel will be in balance and the current over-capacity rate, 107 per cent in mid-November, will be a thing of the past.

The chairman of Youngstown Sheet & Tube predicts that by mid-1953 supply may be greater than demand, and an official of U. S. Steel declares that 1953 will witness the greatest selling drive in his company's history.

This does not alter the plain fact that today manufacturers are snapping up the record output. The cry from Detroit is for more steel. NPA has disclosed that 1,480,000 tons extra will be made available for civilian goods in the first quarter of 1953, but the automobile industry is unhappy because thus far it has not been allocated enough steel for its authorized production ceiling. To alleviate the tight situation Detroit manufacturers have gone to the conversion market in a big way and it appears this will be a strong factor in the first quarter.

Pressure is being put on Washington to decontrol steel as soon as possible and this may occur earlier than officially forecast. Decontrol of civilian requirements will come first, later decontrol of military needs. By April 1 there will be plenty of steel for appliance makers, says DPA.

Meanwhile, inventory restrictions will be eased. The present 30-day limit will go to 45-day on January 1. Warehouse distributors have asked for immediate suspension of the regulation to reserve 50 per cent of their receipts of bars, plates, and cold-rolled sheets and strip to fill top priority orders. They may get it instead of waiting until the new year.

Steel Output Expands Abroad

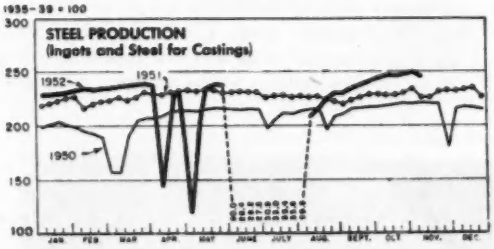
Not to be outdone by America, the rate of European steel production zooms upward. British output is at an annual rate of 18.7 million tons. West Germany hopes to hit 20 million tons. During recent weeks, advertisements of German steel mills have appeared in New York newspapers offering steel billets, slabs, galvanized sheets, and other finished steel products at original mill's prices. Quite evidently the export market for steel will be fiercely competitive in 1953.

Steel production in South America, too, is expanding. Brazil is in front with 900,000 tons of ingot capacity. Mexico, Argentine and Chile have constructed modern plants. Both Colombia and Venezuela, close to high grade iron supplies, have scheduled production in 1953.

Ferro-Alloys to Increase

The Government is anxious to step up production of ferro-alloying materials. These include nickel, tungsten, cobalt, beryllium, tantalum and columbium. The defense program requires large quantities to produce tough, heat resisting alloys for jet engines and military weapons. Unfortunately, none of these occur abundantly in the United States. Use of ferro-alloys has grown even faster than the expansion of ingot steel.

Selected Business Indicator



Source: U. S. Dept. of Commerce

Nickel remains in critically short supply. Canadian production for the first eight months of 1952 totalled only 170,900 tons—some 12,000 tons less than in 1951 in spite of all-out efforts to bring in more metal. The established price of 56½ cents per lb of course does not represent what would be paid if the metal were available. Tungsten is in easier supply, with foreign output increasing and prices abroad considerably below the Government price of $65 per unit for concentrates. Unexpected delays have held back full capacity operation of the new cobalt refinery at Salt Lake and present supply is highly restricted. The

(*Turn to page* 104, *please*)

The "ayes" have it!

Here's the eye-opening fact: Now 25 out of 27 leading engine manufacturers using chrome rings specify **Perfect Circle**

The Standard of Comparison

The application of solid chrome to piston rings, as perfected by Perfect Circle, more than doubles the life of pistons, cylinders and rings. Performance data will be furnished on request. Write Perfect Circle Corporation, Hagerstown, Indiana. The Perfect Circle Co., Ltd., Toronto, Ontario, Canada.

Observations

By Joseph Geschelin

Power Steering

By the time returns are in it will be evident that power steering is another major mechanical device to sweep the industry. Except for the lowest priced cars, power steering will be offered on most makes and models. One of the most noteworthy developments is the adoption of the Bendix power cylinder and externally mounted control valve by Packard, making it possible to use a standard steering assembly throughout. With the field wide open, we hear rumors of electric power steering as well as developments by parts companies not now in the picture.

Power Brakes

Bendix power brakes, first introduced by Packard last year, find their way onto several other makes for '53. Right now this field is shared by Bendix and Kelsey-Hayes. We look for further adoption what with the increasing horsepower race and the need for brakes capable of matching increased acceleration with adequate deceleration. It is interesting to note the effect of words on the public. One prominent motor car builder who has offered power brakes for a number of seasons noted a marked increase in consumer demand since the attachment has been advertised as "power brakes." When they called it a brake "booster" the public did not respond nearly as well.

Turbine Cooling

At the present time practice is divided as to the cooling of torque converters in automatic transmission. A number of leading makes employ heat exchangers, the others use some form of air cooling. Even in heavy duty applications we have the example of Fuller who has been successful in operating with air cooling in IHC door-to-door delivery trucks. On the other side of the picture are some experts in the cooling field who believe that use of a heat exchanger is the most efficient way to cool torque converter oil in heavy duty applications. Their view has gained assent in a new development at Ford. This company announced recently that 1953 pick-up and panel delivery trucks will have an option of a version of the Ford-O-Matic drive. In this case Ford introduces a heat exchanger, as they put it, primarily to take care of unusual service conditions.

12-Volt System

We can now say definitely that four makes of cars will have 12-volt electrical systems in 1953 models. Furthermore, we are assured by the experts that the high output V-8's really need 12-volt ignition for satisfactory operation. It is not just a matter of getting on the band wagon. It is safe to assume that the system will predominate in the industry in a matter of a few years.

Universal Lubricants

Recent developments foreshadow a revolutionary change in engine lubes. Some of the leading refiners are beginning to market special lubes, stemming from the earlier SAE 5W grades originally intended for sub-zero operation. The newer grades, generously endowed with viscosity improvement agents, can span the gap and serve as year-round lubes in engines requiring 10W and even 20W properties. These new high-vis lubes burn with extremely low carbon residue and thereby reduce carbon and lead deposits. In addition, they are so treated as to improve oil economy to levels comparable with current 10W or 20W grades. In new engines or engines that have been well maintained, these special universal grades actually do decrease octane requirements by reducing carbon formation and eliminating the fractions that normally cement lead deposits.

Styling Changes

Although the accent for '53 has been on engines and mechanical developments, a number of new body styles have made their appearance to date and one maker promises a completely fresh styling treatment when the line is announced early next year. Among the new bodies to make their appearance early in the season are those found on Chrysler Corp. divisions, and on Pontiac. Several other makes promise new bodies but it is too early to mention them specifically.

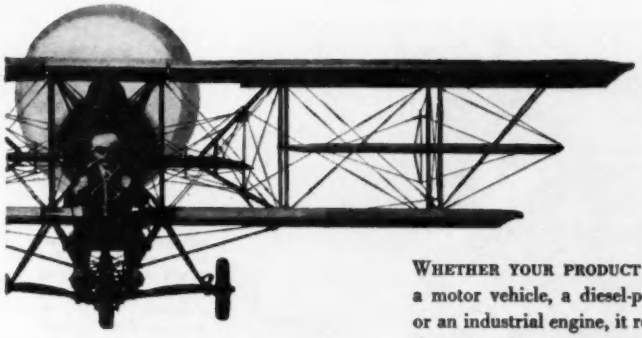
Cold Extrusion

We have finally succeeded in observing the latest installation in the industry for cold extrusion. Judging by what we saw it is fair to assume that the technique will revolutionize forging practice in a matter of but a few years. Profiting by current production experience, cold extrusion could be employed for making parts such as stepped transmission shafts, rear axle pinion shafts, ring gears and other large gear blanks, steel pistons, etc. Cold extrusion promises to eliminate forging scrap, produce parts sufficiently accurate to size as to eliminate preliminary rough machining stages, reduce stock removal, and in general increase productivity materially.

Technical Service

A complete technical information service for industry is now available through the Technical Publication Services of the Hagstrom Co., Inc., 311 Broadway, New York 7, N. Y.

A permanent staff consisting of engineers, scientists, educators, and writers will provide professional services in the preparation of abstracts, bibliographies, catalogs, charts, data sheets, indexes instruction sheets, publicity (press releases), public relations brochures, reports, scripts (scientific and technical), speeches, technical manuals, training aids, and translations. In addition, permanent staff members are available for editing, engineering design and development, literature searches, research studies, statistical analyses, and surveys in technical fields.



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For 50 years Thompson Products has been making precision parts. Its engineers have perfected such vital engine parts as piston pins for the powerful, dependable aircraft engines of today. The same metallurgical knowledge and manufacturing skill are used in making the piston pins for the mass-produced cars, trucks and tractors of today.

Along with piston pins, Thompson's Special Products Division makes valve seat inserts, cylinder sleeves,

Engine performance you can take for granted!

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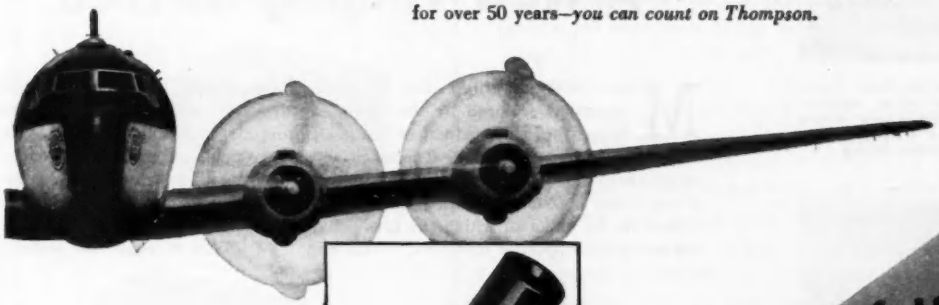

Piston Pin made by Thompson's Special Products Division used in some of America's finest aircraft engines.

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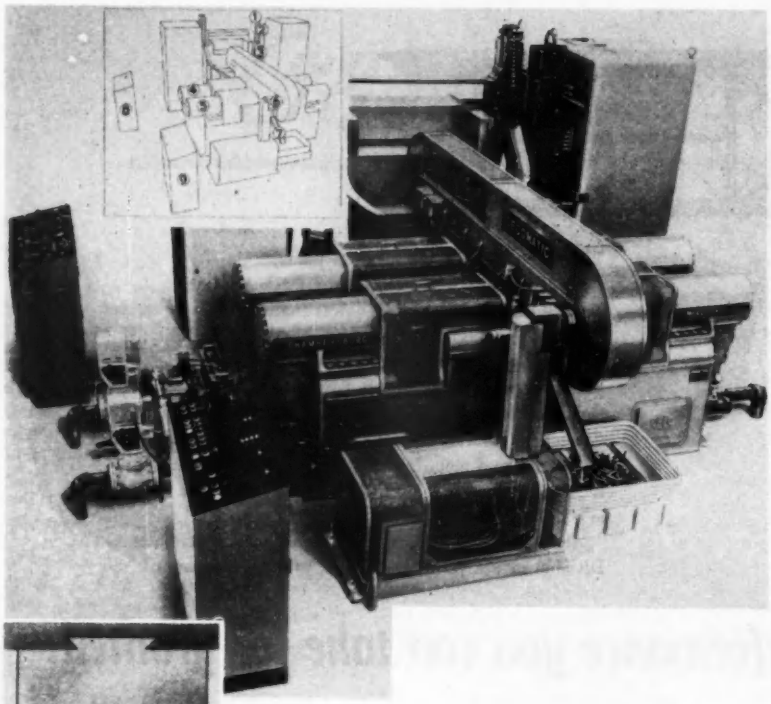


Fig. 5—Complete automatic setup. Units designated by numbers in the inset are as follows:

1—Automatic feed brings stock to heating element; 2—Stock is heated at this area; 3—Chute delivers stock to transfer device which leads the Cecomatic conveyor; 4 — First Impacter rough forges stock; 5—Second Impacter finish forges the stock; 6 — Cut-off trims forging from sprue; 7—Separate chutes discharge forging and sprue to tote boxes; 8 — Control panels for individual Impacters; 9—Control panel for complete Cecomatic process.

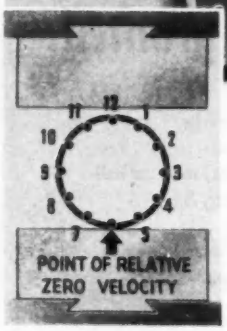


Fig. 1—Section of sphere with points numbered on periphery. Point of relative zero velocity is directly at center of bottom for hammer forging.

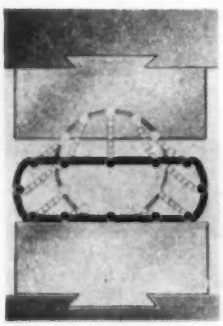


Fig. 2—This figure shows direction and distance traveled by numbered points from sphere to disk when forged on hammer.

Impacting—

A New Forging Method

MANY "drop forgings" can be made automatically by a new method recently developed by the Chambersburg Engineering Co. Known as impacting, this method is forging in mid-air, and is made possible by the Chambersburg Impacter. The machine has two opposing members of equal mass which carry the dies for forming and forging, and are moved in a horizontal plane by compressed air in similarly opposed cylinders. Stock is positioned in the plane in which the dies collide and its deformation absorbs the energy of the opposing members. Time and (*Turn to page* 114, *please*)

Fig. 3—Section of sphere with numbered points on periphery. Point of relative zero velocity is in center of sphere under Impacting.

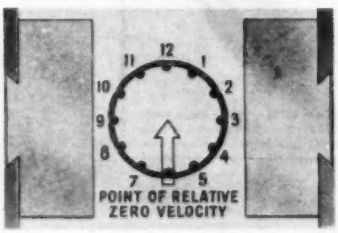
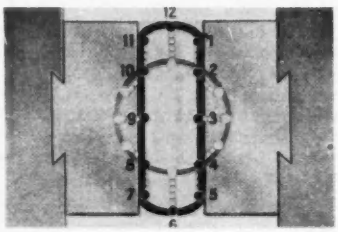
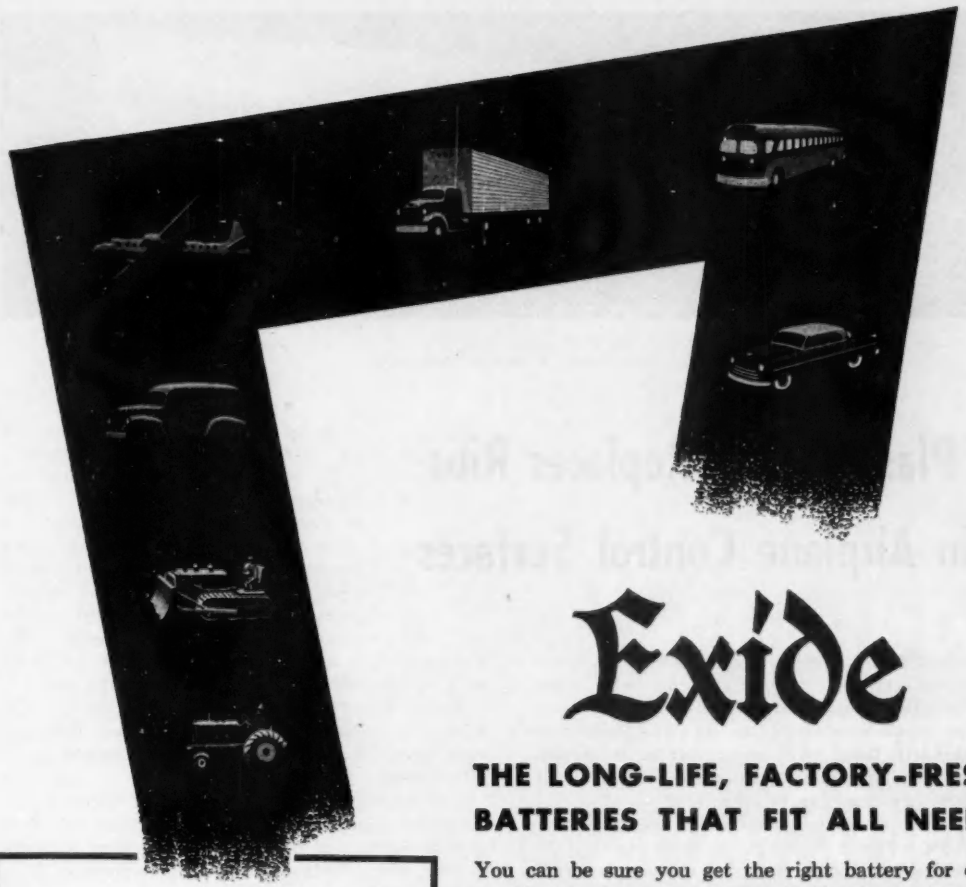


Fig. 4—Direction and distance traveled by numbered points from sphere to disk after Impacting operation has been performed.





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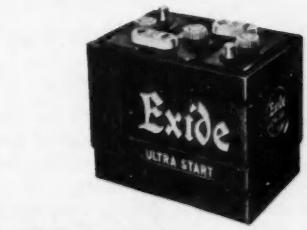
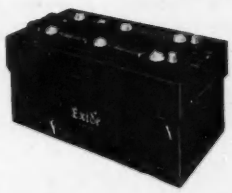
Exide engineers will be glad to work with you on any of your storage battery problems.





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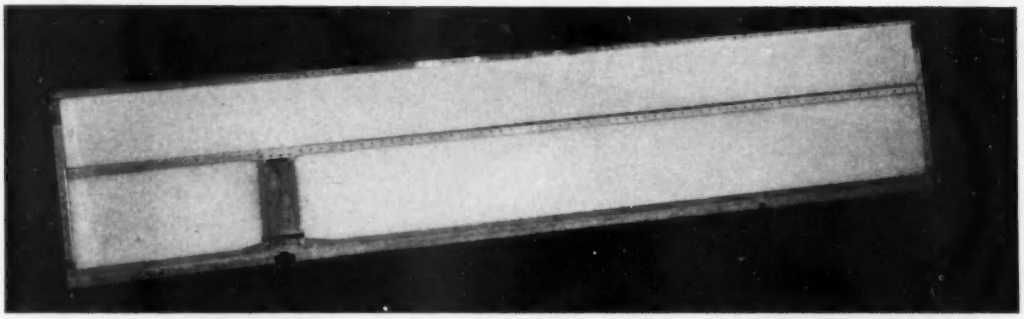


This plan view shows Northrop's use of the Styrofoam core assembly in a control surface, replacing the ribbing. The only reinforcement is the center spar section.

Plastic Foam Replaces Ribs in Airplane Control Surfaces

A METHOD by which complete airplane control surfaces can be made without ribs and with a minimum of rivets has been developed by process engineers at Northrop Aircraft, Inc. By using Styrofoam, a hard plastic foam, as an inner filler for these control surfaces, the necessity for about 80 per cent of the rivets now used can be eliminated .

By use of a special metal-plastic adhesive, the Styrofoam is firmly bonded to the sheet metal. This high-strength adhesive may be applied to small surfaces by means of brushing, and to large surfaces by spraying. It is then sealed to all mating surfaces by pressure contact.

To make the pressure contact, a transparent sheet of polyvynyl alcohol is made into a bag large enough to cover the control surface containing the Styrofoam. When air is exhausted from the inside of the bag, the vacuum provides necessary pressure for contact and sealing of the adhesive to the working surface in question. Areas as large as 13 ft by 3 ft have been effectively sealed by this method.

Use of Styrofoam as a substitute for ribs is said to make possible control surfaces as much as 15 per cent larger in size, with decreases in weight up to 10 per cent.

The tooling required in ribbed surfaces is no longer necessary by use of the Styrofoam. Elimination of the bulk of rivets and the resultant countersinking also affects manufacturing economies to a decided extent.

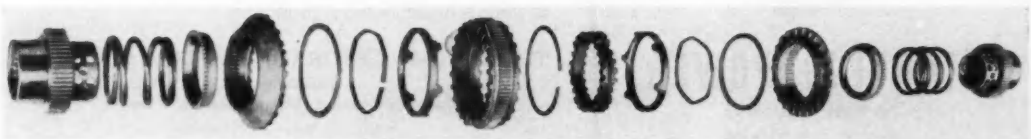
• • •

NoSpin Overrunning Clutch

ONE of the latest developments released by the Detroit Automotive Products Corp., is the NoSpin overrunning clutch for installation in transfer cases, drop cases, or combinations in multi-axle vehicles. Designed to provide a positive drive from a single input source to dual output shafts, it will also permit a difference in the relative speeds of these shafts. In many respects, this device is similar to the well-known NoSpin differential.

Each output shaft receives driving torque when the speed of both shafts is identical. However, if one shaft is caused to rotate faster than the other, it will be released from its central driving member or spider and permitted to overrun until shaft speeds become the same. Either output shaft is free to rotate faster

(*Turn to page* 116, *please*)



Exploded view of the NoSpin overrunning clutch.

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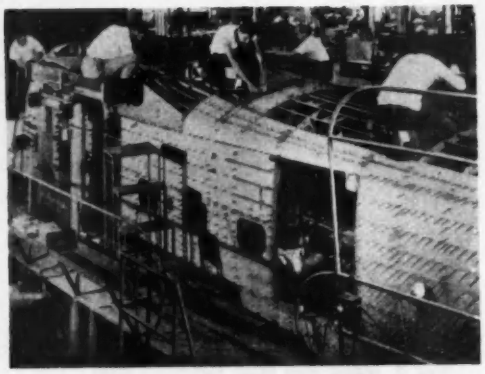
Truck Trailers Bridge Gap in Airplane Assembly Line



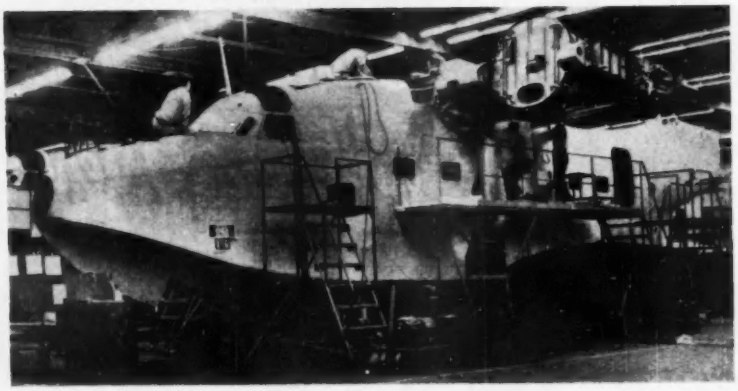
A hull for the Grumman Albatross takes shape at Chrysler Corporation's Plymouth plant in Evansville, Ind. Some 200,000 sq ft of the Plymouth plant is used for the defense job; assembly of passenger cars is assigned to the remaining 300,000 sq ft.

A LITTLE more than a year ago, the Chrysler Corp. Plymouth Plant at Evansville, Ind., was given the assignment to build hulls for the Grumman Albatross air rescue plane. Production of cars continued uninterrupted in one part of the plant while a 200,000 sq ft area was cleared and converted to the defense job.

Automobile workers affected were given special training in airframe work to adapt their skills for their new jobs. Production equipment was put into use as fast as it was installed. By mid-summer last year sub-assemblies were being shipped to the Grumman Aircraft plant in Bethpage, Long Island.

In November, the first hull, 60 ft long, 12 ft wide, and eight ft high, was shipped to Grumman. Since that time the production rate has increased steadily as completed aircraft have been moving out of the Grumman plant to the Air Force, Navy, and Coast Guard.

Shipment of the airplane hull sections is by specially-built truck trailers, one of which is shown here.



Upper Left—On the Grumman assembly line, Albatross with Plymouth-built hull begins to take shape. Here center section and top skin fairings are added while interior progress is underway. Markings indicate plane has already been assigned to the Coast Guard.

Lower Left—The completed hull begins the cross-country haul from Evansville to the Grumman plant at Bethpage, Long Island, for final assembly into a completed air rescue plane. The 60-ft long hull requires a specially-built truck trailer. The largest number of planes are destined for the Air Force, while others are going to the Navy and Coast Guard.

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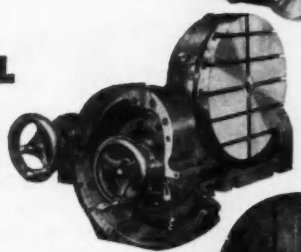

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First Choice P&W *for Accuracy*

Automotive Advancements in Plastics

(*Continued from page 72*)

and generally clarified. The problems discussed may be as follows: 1. Most economical manufacturing method; 2. What plant and what type of equipment is suitable for this project; 3. Further mechanization of facilities and to what degree; 4. Capacity of present facilities and the possibility of enlarging same if necessary; 5. Suggestions and recommendations for simplifications in design and construction, resulting in reduced costs.

At the Ford Motor Co. the engineering staff has a cost study group for the purpose of starting studies during the early planning stages so as to weed out expensive designs and thus direct the design towards the lowest possible cost. How Ford handles this organization was outlined by Emil J. Schanilec, supervisor of the cost engineering section of the Ford engineering staff.

Several examples were cited where engineering cost studies and redesigning made possible overall savings. Certain castings, for years made from cast iron, can now be produced at 16 per cent less cost from die cast aluminum and with a weight reduction of 70 per cent. Where permissible, steel machined gears are being changed to plastic or powdered iron as part of cost reduction programs, he said.

Sometimes higher priced materials may lend themselves to faster manufacturing methods and thus result in less costly end products. As an example, Mr. Schanilec stated a painted part made from cast iron costing 9¢ a pound was changed to stainless sheet steel at 34¢ a pound. Even though the cost of the stainless steel stamping was 60 per cent higher than that of the casting, this was more than offset by an 80 per cent cost reduction due to the use of a blackening process for the stamping in place of the two enameling coatings required for the casting. A further saving was realized by a considerable reduction in rejections by changing to stainless steel. The net result was a cost saving of 10 per cent in favor of the stamping.

A comprehensive presentation of production engineering for body engineers was made by Charles Wyte, of the Fisher Body production engineering section. It was elaborately illustrated with drawings.

One of the outstanding sessions was the panel discussion of body automatic mechanisms with Earl M. Barden, manager of sales engineering, ABF Regulator Products Div., Hupp Corp., as symposium moderator and introductory speaker. The panel consisted of Henry M. Merker, Chrysler Corp.; Joseph Pickles, Hupp-ABF Regular Products Div.; Clyde H. Schamel, Fisher Body; and R. H. Wise, Ford Motor Co.

Much discussion was devoted to the problems dealing with the actuation methods—hydraulic, compressed air, vacuum, and electric—and their comparative costs. The individual electric motor drive was credited with the most numerous advantages because of

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the ease of assembly, maintenance and replacement of the mechanism. In addition the all-electric actuation has the added advantage of having a positive drive in both directions. As to the increased drain on the battery, it was pointed out that the average window regulator or seat adjuster draws only 50 ampere-seconds compared to 300 ampere-seconds for a cigar lighter.

Many more power applications to automobiles are considered possible in the immediate and distant future. It was reported that work is currently being done on designing hood and deck lid actuators. On a new experimental convertible, power-operated door locks are being used in recognition of the fact that without the aid of a steel roof, adequate torsional stiffners in the body is lacking.

The functional design of a van type body adaptable for refrigeration was presented by William R. Chapman, chief body engineer, Divco Corp. A paper on profit-designed vehicles was read by Dwight LaBarre, of Ornas & LaBarre, who emphasized the importance of taking the driver's ideas into consideration.

James H. Liberty, director of decorative research, Tanners Council, in a bid for more business from the automobile industry, reviewed the use of leather as an upholstery material. The development of body engineers was the theme of paper given by Charles G. L. Walker, department head of advance body design and clay modeilng. Chrysler Corp., and William E. Sehn, senior project engineer, Fisher Body Div.

Compressed Air and Gas Institute Receives ATAE Award

One of the nation's highest honors recognizing the value of trade association services has been awarded Compressed Air and Gas Institute, the trade association of manufacturers of industrial air and gas compressors and compressed-air-powered tools and rock drills used by industry.

The honor referred to is the Award of Merit presented to the Institute in the 1952 ATAE Awards for Distinguished Service sponsored by American Trade Association Executives of Washington, D. C.

In the words of the citation, the Institute was presented the award "for its excellent services to its industry and especially for its education program centered on the schools of engineering throughout the United States and on the trade and technical press."

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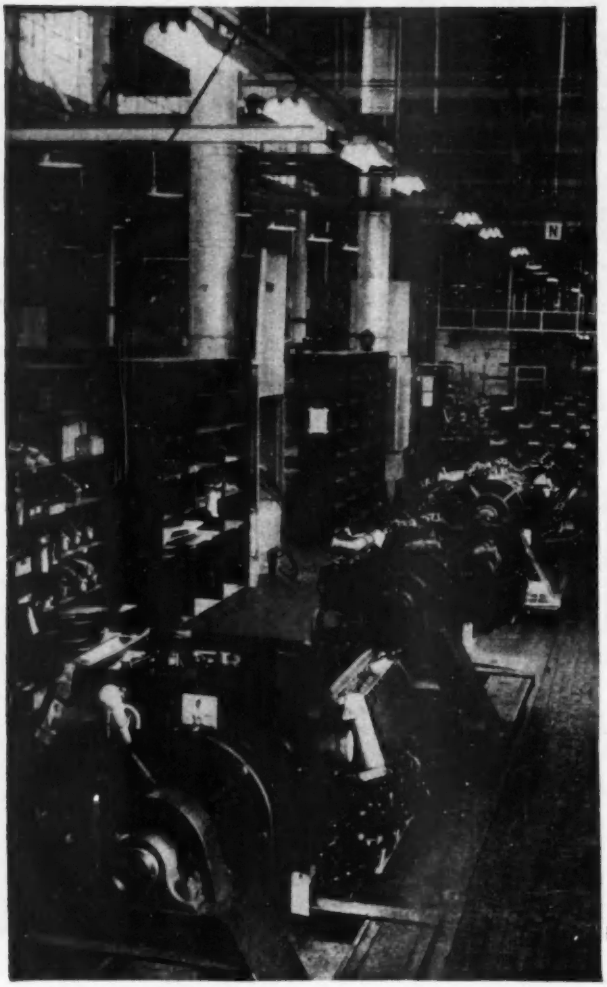


ASSEMBLY LINE FOR MODEL 895 ENGINES. In Lycoming's plant at Williamsport, Pa. Norton Grinding Machines are used in the grinding of components for this engine.

LYCOMING USES 59 NORTON grinding machines on one big engine job

"Lycoming-Built Ordnance Continental Model 895 Engine." That is the official description of the product of the new Lycoming engine factory at Williamsport, Pa.

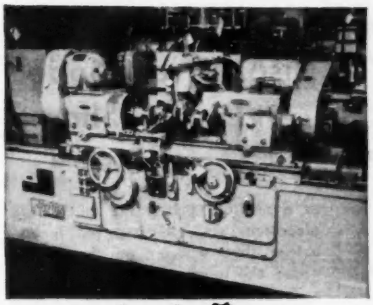
Model 895 is an army tank engine — 6 cylinder, horizontal opposed, air cooled, made in both supercharged and unsupercharged types. For the many grinding operations required to build it, Lycoming engineers selected 59 Norton grinding and lapping machines — an installation worth talking about, worth your serious consideration.

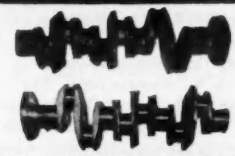
Some of Lycoming's Norton machines and the jobs they do are shown here. Perhaps you have jobs like these. Or perhaps your applications are entirely different. In either case, Norton will be glad to work with you on plans to fit standard or special grinding machines into your present or "post emergency" production.

Remember — only Norton offers you such long experience in both grinding wheels and machines to help you produce more at lower cost.

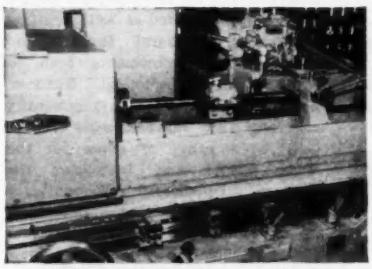
For further information on the world's most complete line of grinders and lappers, see your Norton Representative or write us direct. NORTON COMPANY, Machine Division, Worcester 6, Mass.

BATTERY OF 17 NORTON MACHINES. This picture shows an installation of seventeen 6" x 18" CTU Semiautomatics used for miscellaneous grinding of 80 different kinds of parts.

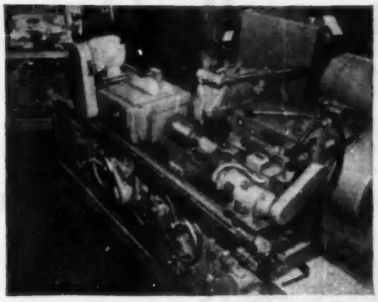




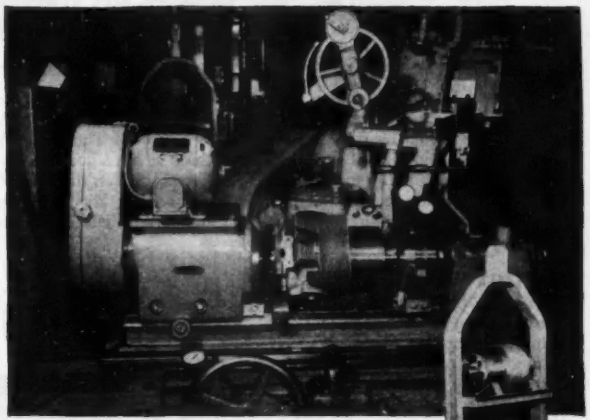
MAIN CRANKSHAFT BEARINGS are finish ground on Norton 14" x 36" LCTU Semiautomatic grinding machines. An interesting detail is that crankshafts are not centered to depth; therefore a base mounted locator is used on each machine. Crankshafts shown as forged and finish ground.



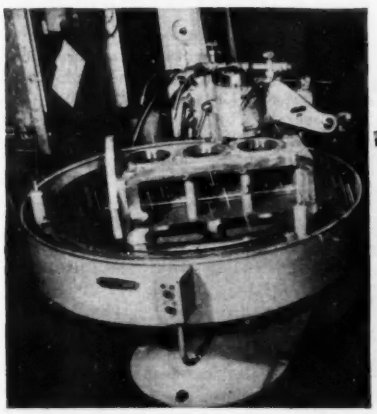
CAMSHAFTS are ground all over, with 3 grinds on the cam contours, all with small diameter wheels because of re-entrant curve. Norton 6" x 30" CTU Semiautomatic and No. 2 Cam-O-Matic machines are used. One of the latter is shown grinding the contours. Model 895 camshafts illustrated, before and after finish grinding.

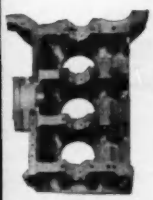


CAST ALUMINUM PISTONS are used in the unsupercharged engine, forged aluminum pistons in the supercharged. All are ground on Norton 10" x 36" CTU Semiautomatic grinding machines, equipped with the compound Cam-O-Unit and the self-contained motor driven truing device which trues the wheel. At right: A Model 895 piston forging and the finished product.



CYLINDER BARRELS on the Model 895 engine require many intricate grinding jobs. Here a Norton 14" x 36" LC Angular machine is grinding the flange face and pilot diameter. Other Norton machines used in grinding this part are 10" x 36" LC Angular, 10" x 18" Semiautomatic and 10" x 36" Semiautomatic with Cam-O-Unit. Insert: Barrels in holding frame, ready for grinding.

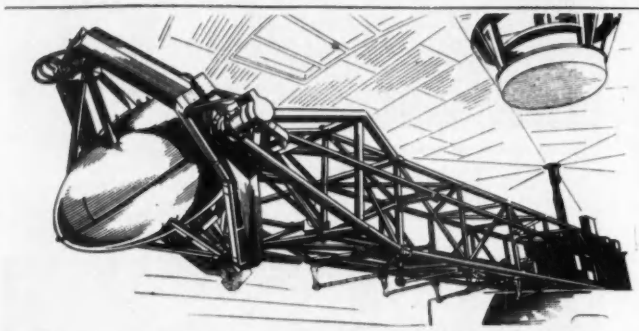




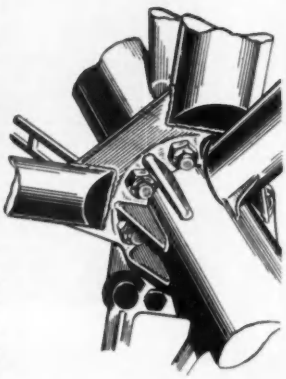
CRANKCASE JOINT FACES are lapped on Norton No. 2F lapping machines, using 36" bonded abrasive laps. These machines do fast, precise work on soft metals, leaving a flat, clean surface which is free from imbedded lapping compound. View of crankcase shows the lapped surface.

Fastener Problem of the Month

HUMAN CENTRIFUGE **DECEMBER, 1952**



PROBLEM Acceleration forces up to 40g are developed by the world's largest human centrifuge, a device for testing high speed maneuvers on jet-plane pilots and equipment. Built by the McKiernan-Terry Corp. for The Naval Air Development Center, Johnsville, Pa., this giant machine whirls a gondola horizontally, can move from dead stop to 173 mph in 7 seconds. When the 50′ arm rotates, huge tensile loads tend to pull the different sections apart. The fastenings selected had to be not only exceptionally strong, but also *sure* to hold fast in spite of the fluctuating stresses and the vibration involved.



SOLUTION The largest tensile load on any of the arm's four joints is 225,000 lbs and is carried by eight one-inch bolts and self-locking, vibration proof Elastic Stop Nuts. A strength test of a sample joint showed that the steel tubing failed first, without damage to the joint flanges or the bolts and nuts. Another vital spot is the airtight seal between the two halves of the gondola. These shells are clamped together with 288 bolts and Elastic Stop Nuts. In fact, all important sections of the centrifuge—the four arm sections, the counterweights, the gondola, the three outrigger arms supporting the gondola drive shafts—all are fastened with Elastic Stop Nuts. The holding quality of these nuts during vibration enables them to resist unlocking and destructive interplay. Where strength and foolproof security are needed, they provide it.

LET US HELP solve your fastening problems. Our engineers, here at ESNA, should be able to suggest the one best fastener to meet your specific needs. No obligation, of course.

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British Makers Display New Models at London Show

(*Continued from page 64*)

in a medium priced 122 cu in. displacement six, has just put a low-priced three-wheeler on the market under the name of Petite. This has a front steering wheel with suspension by double coil springs drive to the rear wheels from a Villiers single cylinder, two-stroke engine of 21 cu in. displacement. The primary drive is by triple V-belts and from the three-speed gearbox to the rear axle by chain. The rear wheels are independently sprung. Frame and body are integral light gage steel framing with light aluminum paneling. The car is a two-passenger two-door with folding top. Its overall length is 123 in. and complete weight 840 lbs. It is listed at $807.

Vauxhall (General Motors) announced only refinements both in styling and mechanical features. Brighter colors, which are generally a strong 1953 feature, were emphasized by a range of seven for the Velox model and four for the Wyvern. Upholstery and interior paintwork blend with the new body colors. Mechanical improvements covered the heating system, a snow shield to protect the transmission controls, improved hood lock, a speedometer reading up to 90 mph, a wider range windshield wiper and improved shock absorbers.

Ford also showed only detail improvements, comprising a redesigned instrument panel, the instrument cluster being encased with the steering column and brought nearer the driver; and a parcels shelf under the panel extending across the full width of the car. The Zephyr Six convertible de ville, shown for the first time last year, is just going into production. It has a power actuated top, operated by a pushbutton on the dash. With the Anglia, Ford had the lowest priced sedan on the British market.

American representation was of a prominent nature, with 1953 models being shown by Chrysler, Plymouth, Dodge and De Soto. The Dodge V-8 was entirely new to the Britishers, as was also the six cylinder Aero Willys. The completely revised styling of Ford, Lincoln and Mercury automobiles was seen in London for the first time.

It's hard! It's tough! It's easy to machine! It's ideal for parts like these...

1. DIESEL INJECTION PUMPS
2. LATHE CENTERS
3. SLITTING ROLLS AND KNIVES
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11. ASBESTOS DISINTEGRATORS
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IT'S 52100!

ALL the parts you see listed above call for a steel that's hard, tough—yet easy to machine. And that steel is 52100—a high-carbon steel originally developed for ball bearings. It's now being used for a wide variety of machined parts where great strength and exceptional wear resistance are essential.

52100 alloy steel has high tensile strength and high fatigue strength. Its fully spheroidized structure makes machining easier. The 52100 steel produced by the Timken Company will withstand a working pressure of 200,000 p.s.i. It can be oil quenched to a maximum hardness of 65/66 Rockwell C.

One of the world's largest producers of 52100, the Timken Company is the only company that offers it in all three finished forms—bars, tubes and wire. And because of the Timken Company's rigid quality control at every step in production, you get uniform quality in every shipment. For small runs or emergency requirements, you can get 52100 tubing from the Timken Company's mill stock of 101 sizes ranging from 1" to 10½" O.D.

For a stock list of available sizes, grades and finishes, write The Timken Roller Bearing Company, Steel and Tube Div., Canton 6, O. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING

METALS

(*Continued from page* 86)

Government purchase program for columbium-tantalum concentrates at premium prices has been extended with an incentive bonus for these scarce ores needed for defense purposes.

Future Copper Market

New copper production from projects financed by Government and private funds will be added to normal mine and secondary supplies in increasing amounts for the next five years. The increase will be gradual in 1953 but will accelerate in 1954 to 138,000 tons new capacity, to 215,000 tons in 1955, and about 300,000 tons in 1956 when the giant San Manuel mine is expected to start producing.

Nearly all this new production carries a Government price guarantee that approximates the present 24½ cent ceiling price. The range for the major projects is from 22 to 25½ cents per lb. Some small, high cost projects have been granted subsidies 6-7 cents above the present ceiling. In most cases the price guarantees will continue for a number of years after production begins, and carry the provision that the Government is obliged to accept the metal at the agreed price if it can't be sold to industry at the same or a higher price.

The result is that if the copper price should weaken below the present level, very little of this new production would come on the open market to drive the price lower. In all probability it would be quitely moved into the Government stockpile and immobilized for industrial use, at least temporarily. The knowledge that this metal would not be dumped regardless of price would in itself be a strong stabilizing factor on the market.

Copper Remains In Tight Supply

With copper in strong demand today and the foreign price firm at 36 cents per lb, just 50 per cent higher than the domestic ceiling, it may be only of academic interest to consider a weak market. The latest figures from the Copper Institute give no indication of an easier supply situation. Domestic crude output in September was well below the average of 1951, shipments to fabricators jumped to 134,600 tons for the month, and refined stocks dropped to 71,400 tons at the end of September, contrasted with 83,700 tons a month earlier.

Reports have persisted that copper would be de-controlled before the end of the year, which would be the logical way to end the extremely unsatisfactory two-price market situation. No confirmation has been heard from Washington that this would be favorably considered until later in 1953.

The foreign supply wasn't helped by the three-week strike at the big Northern Rhodesia copper mines, which cost British buyers about 21,000 tons of copper. It forced London to enter the Chile market and compete for copper at the 36 cent price until the work tie-up was ended.

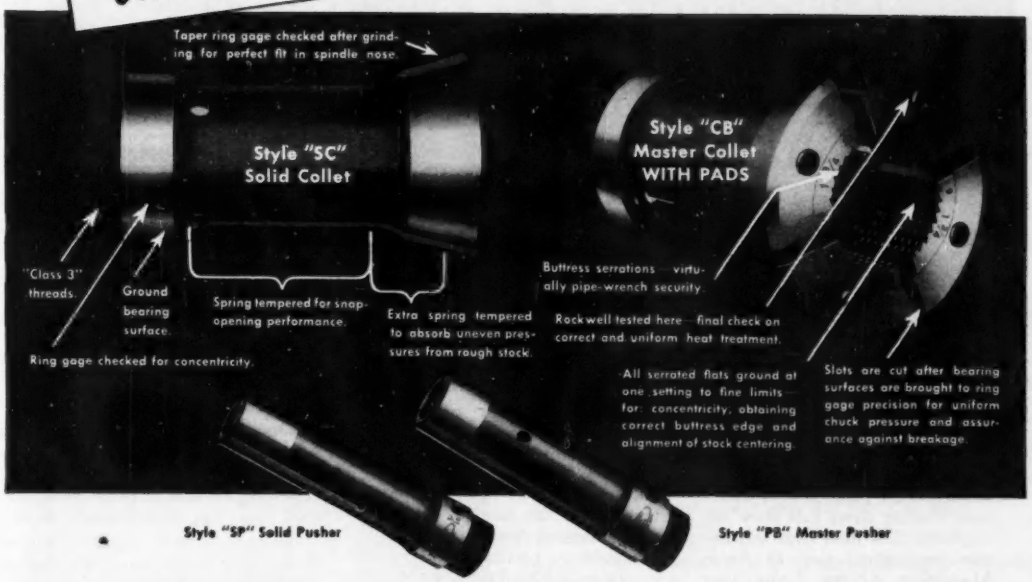
Lead Firms

After selling at 13½ cents per lb, the bottom price reached after its long retreat from 19 cents that started last May, lead advanced confidently to 14½ cents in November, as was predicted.

Industrial users want more lead, and stepped into the market in a big way once convinced that London selling was over. Buying was reported very heavy in November with a substantial amount of unfilled orders

Memo— to the users of 45,000 Acme-Gridley Automatics

CHECK THESE FEATURES OF NAMCO COLLET PERFORMANCE:



National Acme collets and pushers are built by National Acme for National Acme machines and are available only from National Acme.

This is important for you to remember. It is your positive assurance of top performance. These National Acme components are made to function properly on *your Acme-Gridley*—designed on the basis of our fifty years' experience with the stock feed functions of this type of machine.

We offer you no trick designs—just sound engineering practice, enabling us to assume the same responsibility for the high performance of these stock feed components as we do for the machines to which they are engineered. For peak performance specify Namco, both for multiple and single spindle Acme-Gridley automatics and for the pushers, collets and pads used on them.

Complete details and prices on all National Acme collets, pushers, pads and bushings for Acme-Gridley automatics are contained in a separate Stock Feed Components Catalog, No. CP-49. Ask for your copy.

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carried over every day by producers.

Better sentiment followed announcement from London that an agreement had been reached with consumers by the British Ministry of Supply under which the remaining lead stocks, now estimated at no more than 30,000 tons, would be sold gradually over a period of 14 months. This feeling was strengthened by a statement from the Defense Administrator, who asserted that production cutbacks in lead and zinc were causing real concern in Washington. Actually, he continued, there was no surplus of domestic production and unless output were maintained another shortage similar to 1950 was just ahead. Statistically, the domestic lead situation is good. Refiners' stocks at the end of September were 31,837 tons, down 27,000 tons from the 58,775 tons reported at the end of May.

Zinc Sentiment Improves

The improved lead market has strengthened sentiment in zinc. Historically, lead and zinc prices move together without too much time lag. Zinc has taken a worse drubbing than lead in the commodity markets, declining from 19½ cents per lb to 12½ cents without recovery up to mid-November. At 12½ cents the metal is a shade under the average price in 1949 of 12.86 cents. Considering the rise in commodity prices generally since then, zinc is undoubtedly cheap.

Demand for zinc in recent weeks shows some improvement and statistically the picture looks a little better. Shipments of slab were higher in October at 84,500 tons, and stocks in the hands of producers at the month's end showed a reduction of 4000 tons over a month earlier. This was the first notable reduction since the end of July. It was gratifying to the zinc trade to find a better demand from the die casters for special high grade metal which had been in the doldrums for months. Producers think that consumers' inventories must be quite low, for since the end of the steel strike orders have been placed on a hand-to-mouth basis.

Less concern is also felt over British selling of zinc after January 1 when trading in zinc futures starts on the London Metal Exchange. The disastrous experience with lead has evidently taught a salutary lesson.

The low zinc price has closed down many mines in the northwest and evoked a storm of protest from the mining communities. In British Columbia the Trail smelter which buys

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Considering silicone rubber for parts or equipment?

General Electric silicone rubber is now available in many new forms—forms which greatly increase your design possibilities. You're familiar with conventional molded and extruded parts fabricated from G-E silicone rubber, but do you know that silicone rubber is now being fabricated in the following forms?

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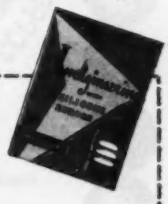

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GENERAL ELECTRIC

large amounts of U. S. zinc ores has placed an embargo on shipments and sharply rationed the amount of ore it will buy. Domestic overproduction is being remedied the hard way.

DPA at long last has realized that its expansion target for 1955 of 1,320,000 tons was too high and reduced its goal to 1,245,000 tons. It was admitted that too little consideration had been given to substitution of other metals for zinc, notably of aluminum, in estimating future demand. But with zinc at 12½ cents while aluminum remains unchanged at 20 cents per lb the threat of aluminum substitution is evidently very much less than it was six months ago when zinc was selling at 19½ cents.

Stainless Steel Aircraft Nacelles

(*Continued from page 49*)

The sub-sub-assemblies are tacked with portable spotwelding guns, specially designed for the job, and held in position by the operator while the spot is made. To facilitate positioning, the guns have various counterbalances and counterweights.

After tacking the sub-sub-assemblies, the ⅝ in. center-to-center spotwelds that join the stringers to the skin are performed on a Tayor Winfield roll welder.

The sub-assemblies are tacked with portable guns, and the bulk of the actual spotwelding is done on pedestal type spot welders. In the final assembly operations, all spotwelds must be made using portable guns. After the barrel is assembled and assumes the shape of the nacelle, it is mounted in the shipping dolly and all subsequent operations are performed with the barrel in the dolly.

In all there are 21 pieces of spotwelding equipment in the line, including 15 specially designed portable spot-weld guns. The welding problem in making the nacelles is secondary in difficulty only to the forming operations. In many cases as many as five thicknesses of stainless, varying from 0.012 in. to 0.032 in. are spotwelded at once. The stringers alone in each unit require 7680 linear inches of attachment, totaling almost 20,000 individual spot welds. There are over 32,000 certified structural spot welds in each assembly.

BOOKS...

ECONOMICS OF AMERICAN MANUFACTURING, *by Edward L. Allen, published by Henry Holt and Co., 383 Madison Ave., New York, N. Y. Price, $6.95.* Nineteen representative industries within five general categories—basic metal, basic nonmetallic, metalworking, textile and allied, and consumer specialty—are examined in this book. Automobiles, machine tools, and aircraft are among the components included within the foregoing groups. After an introductory chapter on the role of manufacturing in the American economy, the author analyzes each industry from three standpoints: its place in the national economy—relative size and importance, use pattern of the product, export-import relationships, and relations with the Government; structure of the industry—corporate ownership and control, location and capacity of plants, technology of manufacture, and input and cost factors; and financial factors—prices and pricing policy, profits, and future outlook. The work is illustrated with 208 photographs and 68 diagrams.

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Aeroquip Detachable, Reusable Fittings reduce hose line inventory. For on-the-spot replacements cut bulk hose to required length and attach fittings.

Unique Fitting design provides quick, easy assembly and assures positive grip on hose. No adjusting is required after assembly.

Hose is constructed of seamless synthetic rubber compound reinforced with two cotton braids and a high tensile steel wire braid.

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AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

Dodge Tooling

(*Continued from page* 69)

third hole is drilled to ½ depth.

Proceeding to the next station, four holes are drilled to 1/3 depth in Nos. 1, 2, 3, and 4 mainbearing halfbores, a ½ in. hole is drilled to 2/3 depth in No. 5 halfbore, oil pump shaft hole is step reamed—33/64 to 15/32 in. diam, and 18 holes for 5/16-18 taps are drilled in the bottom of the block. These operations are performed by the 24-spindle left hand head. The right hand head at station 7 chamfers two holes and drills one hole to 2/3 depth in the oil filter pad. Operations performed by the left hand head at station 8 include drilling the main bearing halfbore holes, No. 1 through 4, to 2/3 depth, finish reaming the oil pump shaft hole, drilling No. 5 main bearing halfbore hole to depth, and chamfering the 18 holes previously drilled. The right hand head is idle.

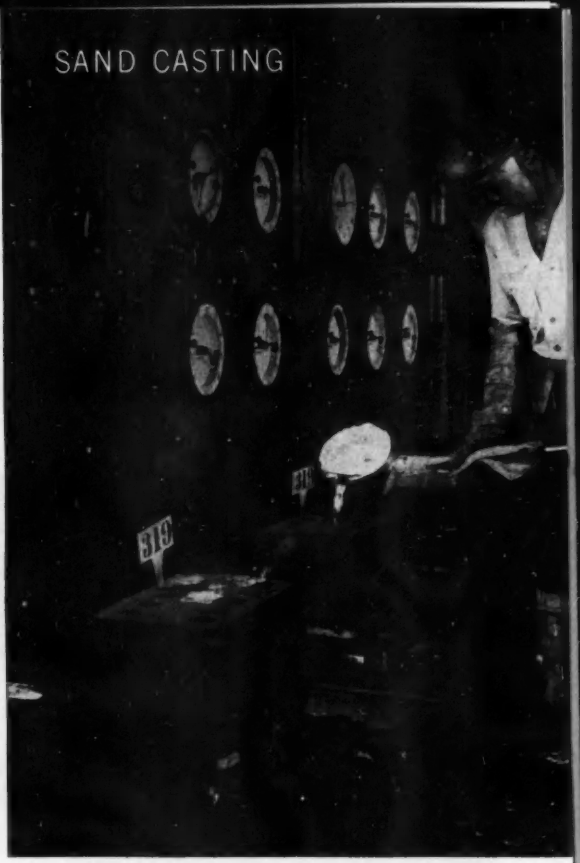
Throughout the next six stations similar drilling, reaming, tapping and chamfering operations are carried out on the bottom of the block. The first four mainbearing halfbores receive another hole, the oil filter pad is drilled, a No. 5 bearing halfbore hole is reamed, and the drain hole on the right hand side of the block is tapped. At station 15, the cylinder block is unloaded.

For further machining on the cylinder block, a Cross 16 station transfer type horizontal drilling machine is being utilized. Here, the cylinder block is loaded and located at the first station. Locating is again done by means of the two ¾ in. holes in the bottom of the block. This machine semi-finish and finish reams as well as brushes the 16 valve tappet holes. It drills a hole on a compound angle into the camshaft hole from each cylinder head face. Further, it step drills, reams, and chamfers the oil level gage hole on the right hand side of the block.

In a subsequent operation, the eight cylinders are finished bored to 3.435-3.4355 in. diam on an Ex-Cell-O angular precision boring machine. Here, the part is automatically loaded into the fixture with the bottom down and the front end leading. It is located from the two ¾ in. holes at the bottom of the block.

Two Barnes honing machines equipped for automatically handling the block are utilized to rough and finish hone the cylinders to 3.4375-

(*Turn to page* 114, *please*)



ALCOA MAKES LIGHT METAL CASTINGS BY ALL FOUR PROCESSES

When you discuss your casting job with an Alcoa sales engineer, you can be sure that he will recommend the process that best fits your needs. If your part should be die cast, two modern die casting plants and 30 years' die casting experience back his recommendations. He can also suggest sand casting, for Alcoa has five sand foundries and 41 years' experience in the casting business. Permanent mold castings? Four of our foundries make permanent mold castings. One in Detroit specializes in plaster casting. Obviously, Alcoa sales engineers have no axe to grind for any one process.

The same applies to choice of light metals. Alcoa's casting facilities are equipped to handle both aluminum and magnesium. Alcoa casting specialists are old hands at working with light metals. Alcoa engineers are completely unbiased in their approach to any question you might put to them. For these reasons, Alcoa sales engineers are quick to point out the advantages of both aluminum and magnesium for your application.

Your first step toward using these extensive facilities is to call your local Alcoa sales office—listed under "Aluminum" in the classified phone book. Or write:

ALUMINUM COMPANY OF AMERICA
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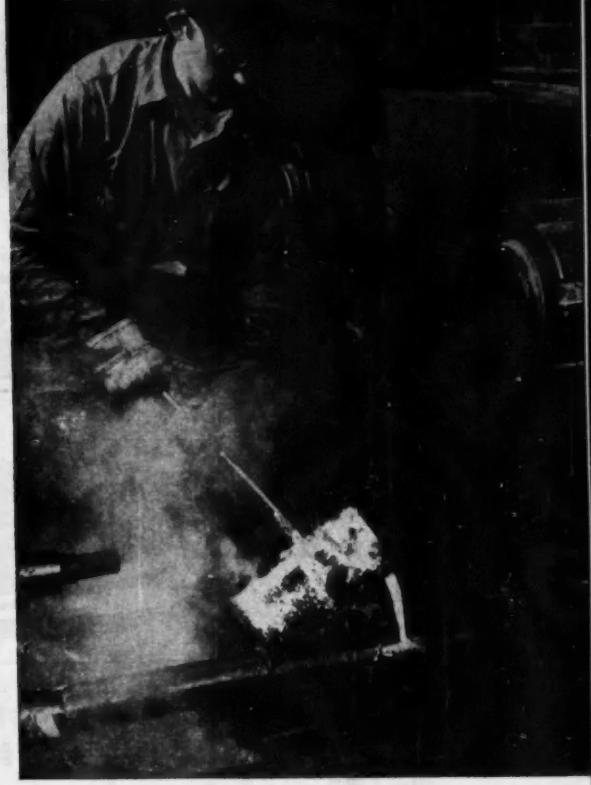
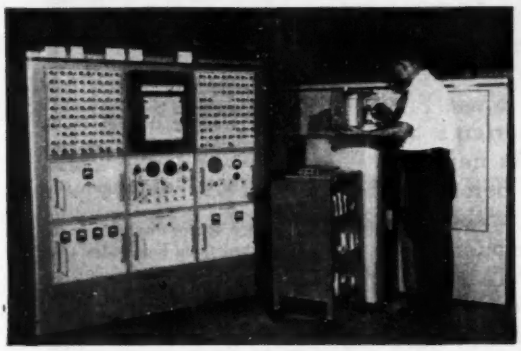
PERMANENT MOLD CASTING

DIE CASTING





ALLOY CONTROL—Alcoa foundries are equipped with direct reading quantometers, like this. In less than a minute, these instruments provide a complete spectrographic analysis of an alloy being cast.

RESEARCH TEST—In Alcoa's 70,000 rpm whirlpit, rotating parts can be tested to destruction. Provision is also made for brittle lacquer and strain gage investigation while the rotating part is under stress.

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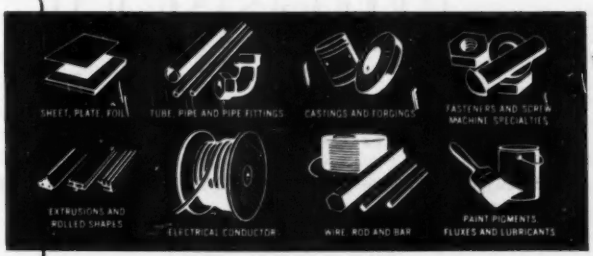
WHATEVER YOUR NEED IN ALUMINUM

Your local Alcoa sales office is headquarters for "everything" in aluminum. Look for Alcoa under "Aluminum" in your classified phone book.



(*Continued from page* 110)

3.438 in. diam. In both cases, the part is located from the two holes in the bottom of the block. Micromatic hones and Barnesdril magnetic separators are used on both machines.

It is also of interest that Pratt & Whitney air gage equipment is used for checking the mainbearing bores before the block is placed on the assembly line.

Impacting

(*Continued from page* 90)

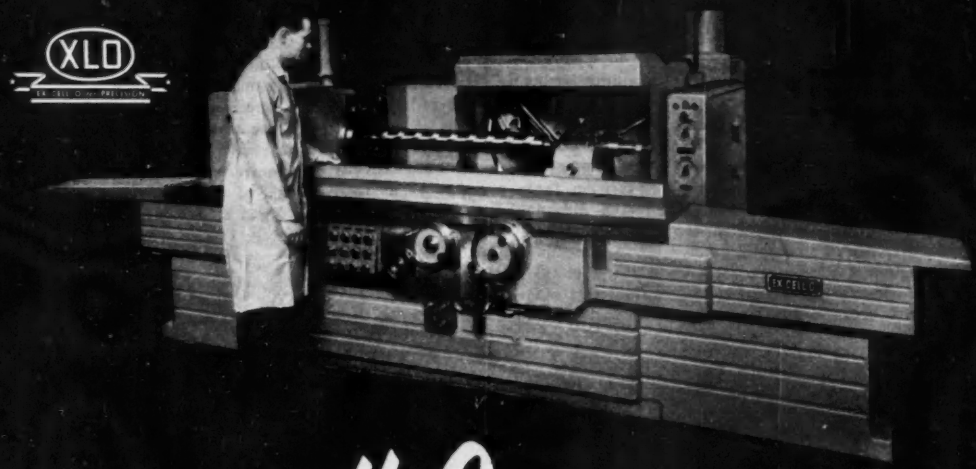
duration of movement of these members, which are known as impellers, is controlled by electronic devices which actuate inlet and exhaust valves. An electronic compensator maintains the plane of impact on center. Varying the striking air pressure provides a means of controlling velocity of the impellers, while a still finer adjustment may be made by varying the time of the valve openings.

Duration of contact between the stock and die is greatly reduced in comparison with other methods in which heated stock is in contact with at least one member of the dies for a considerable period. As the stock and die are in contact only while the work is being done, operating temperature of the die is lower with the Impacter. In addition, the energy of the impellers is almost entirely absorbed, resulting in an appreciable increase in the temperature of the stock. This facilitates processing through multiple stations without reheating, thus saving heat by forging at a lower initial temperature and eliminating re-heat.

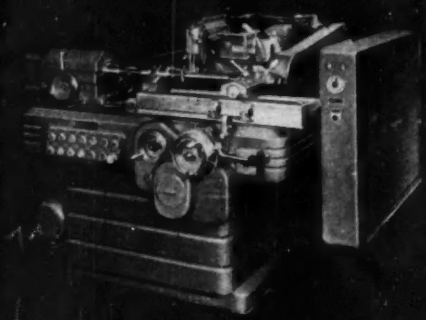
Less energy is required when the stock is worked from both sides than when it is worked from one side only. This is illustrated in Figs. 1, 2, 3, and 4 which show movement of metal when worked by these two methods. With the Impacter, distance traveled by the metal is approximately 23 per cent less than with the conventional hammer.

Because of its unique principle, the Impacter is particularly well adapted to high-speed, automatic operation. The process, called "Cecomatic forging," incorporates automatically-controlled movements of the stock through the production cycle, ending with the forging ready to be trimmed. The basic unit consists of one or more Impacters in combination with other

(*Turn to page* 116, *please*)



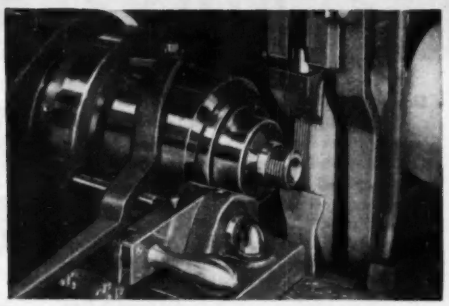
Ex-Cell-O Thread Grinders



GRIND THREADS ON PARTS FOR PLANES, GUNS, ROCKETS

Ex-Cell-O Precision Thread Grinders are in the thick of the defense program. They're used for grinding threads on parts for both jet and reciprocating aircraft engines and many items of armament. For accurate threads on hardened steel parts the threads must be ground after hardening. For alloys and stainless steels that are tough, though not extremely hard, thread grinding is often more economical than other methods.

Internal, external, and universal thread grinders are included in Ex-Cell-O's complete line. If you are considering thread grinding write or phone to Ex-Cell-O in Detroit for more information and complete specifications. Better yet—call in your local Ex-Cell-O representative and show him the job. He's qualified to help you.



Threading gun barrels on a Style 33 Thread Grinder with multiple rib wheel.

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52-13

Impacting

(*Continued from page* 114)

standard production equipment items to form a machine capable of producing a wide variety of forgings automatically. A complete assembly using two Impacters is shown in Fig. 5.

Cecomatic forging is expected to find extensive use in automatic precision production of components for jet engines. A wide variety of blades and buckets have been produced successfully in the shops of Chambersburg Engineering Co. Two units have already been delivered and are now cold coining jet blades. Before the end of this year, several others will join those already in service.

Four units are being built for Packard Motor Car Co. to automatically precision forge a range of at least seven different J-47 (General Electric) blades.

An installation for Oldsmobile Division, General Motors Corp., is in its final test stages. It will be used to Impact rough blades for the J-65 (Sapphire) engine. These rough blades will require subsequent machining operations to bring them to dimensional tolerance.

Precision forged blades, such as those which will be produced by the machines being built for Packard, will require only polishing and cold coining of the blade section which is forged to size.

NoSpin Overrunning Clutch

(*Continued from page* 92)

than the driving element if caused to do so by external forces. However, neither output shaft is permitted to rotate slower than the central driving member.

Whenever one shaft is overrunning it receives no torque since all driving torque is then transferred to the slower running shaft. When the overrunning shaft slows to the speed of the other shaft it becomes engaged and driving torque is distributed equally between the two shafts. Since this unit is sensitive only to speed differences, these characteristics remain the same whether the vehicle is driving or coasting and in either forward or reverse direction. Moreover, reversal of torque will not cause the overrunning clutch either to cycle or exchange drive from one side to another.

The basic structural design of the NoSpin overrunning clutch is similar to the NoSpin differential except that the holdout ring of the clutch, as illustrated, consists of lugs and ramps with flat lands, whereas the NoSpin differential consists of uniform cams and is actuated by a key located on the inside diameter of the spider.

The holdout ring of the overrunning clutch is restricted from free rotation by a friction spring insert mounted between the fixed cams of the clutch members and the holdout ring, or by the tension of the split type holdout ring used in certain small sized assemblies. In this respect it is similar to the holdout ring used in the silent-type NoSpin differential where resistance to free rotation is obtained by the gripping of the split ring.

Either the single or dual type ramps and flat lands on the holdout ring lugs of the NoSpin overrunning clutch serve to raise and hold the driven clutch member completely disengaged during each period of overrunning. The lugs serve to limit the

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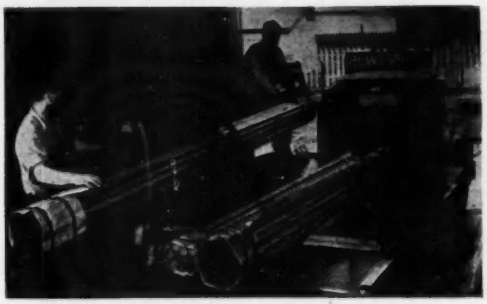

The Reliance Steel Company of Los Angeles now has available a complete line of Dow Magnesium sheet, plate and extrusions.

The first West Coast distributor for Dow magnesium provides another step towards meeting the ever-increasing demand for this lightest of all structural metals. Stock material ordered today will be delivered tomorrow.

The Reliance Steel Company has long been in the metal jobbing business concentrating primarily on steel and aluminum. Now, as an authorized Dow magnesium distributor, they are applying their years of experience to this lightweight metal. They carry a complete line of wrought magnesium alloy products including sheet and plate in various gauges and tempers; rod, bar, tubing and shapes. Complete facilities are available for saw cutting and shearing.

Dow is pleased to make this announcement about the Reliance Steel Company for it means that all users on the West Coast are now able to receive the best in prompt service and delivery on all standard magnesium wrought products. For complete information write the Reliance Steel Company, 2068 East 37th Street, Los Angeles 11, California. Be sure to get on their mailing list for literature and stock data. THE DOW CHEMICAL COMPANY, *Magnesium Department*, Midland, Michigan.

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DOW

travel of the holdout ring in either direction to the length of the slots on the outer diameter of the center cam. Elimination of the spider or central driving member key permits the overrunning side to continue regardless of torque conditions, whether driving or coasting. The ramps and flat lands of the holdout ring lugs are higher than the fixed cams of the driven clutch members which start the initial disengagement.

There are several possible modifications of holdout rings, center cams and spring capacities to accommodate vehicle design characteristics suitable for the following applications:

1. A 4x4 vehicle in which the front and rear driving axles are to operate with the same ratios: that is, without fixed overrun. This also applies to the rear driving axles of a tandem drive unit (6x4) and eliminates axle fight or trapped torques.

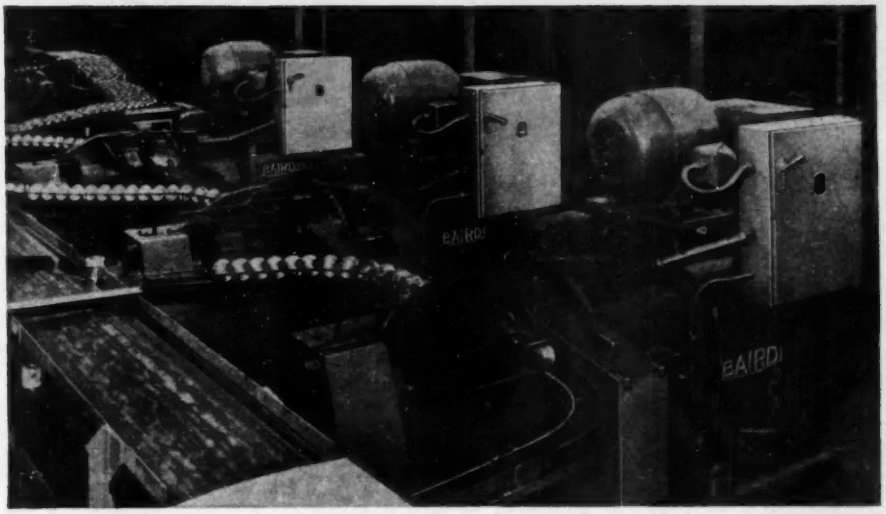
2. In all multi-axle drive vehicles (4x4, 6x6 or 8x8) in which the forward driving axle groups are operated with a fixed overrun while the rear axle group is driven positively, without overrun or underrun.

3. In transfer cases and/or drop boxes of 4x4, 6x6 or 8x8 vehicles in which the steering/driving axles have a fixed overrun; and to the rear driving axle groups which may overrun if and when special operating conditions require.

BOOKS . . .

FILL'ER UP, by Bellamy Partridge, published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, N. Y. Price, $4.50. The story of fifty years of motoring, this book records with gusto, color, and humor all the excitement of the years when American motoring was growing from awkward adolescence to streamlined maturity. Published on the fiftieth anniversary of the American Automobile Association, the volume takes careful note of the role which this organization has played in the development of the U. S. automobile. The tale is a romantic one of men and the machines they created which were to exercise a profound influence on the U. S. way of life. Such picturesque figures as the Duryea brothers, Henry Ford, Barney Oldfield, and the Stanley twins are painted in all their pioneer grandeur as they blazed the early trails of motordom. The author describes the cars of these bygone days with a touch of deserved reverence and depicts them in action in such classic competitions as the Glidden Tours and the Vanderbilt Cup Races. The drama and nostalgia of the past lead naturally in the book to an absorbing discussion of the nation's highways and byways today and the pleasure to be derived from traveling them. Finally, there is a glimpse into the future which seems to hold promise of better highways and safer cars.

ASK **BAIRD** ABOUT IT!



BAIRD *Automatic* CHUCKING MACHINES
Join mass production lines at new FORD plant

The Baird Machine Company is pleased to share, with other manufacturers of modern automatics, in the high speed production at the Ford Motor Company's new Cleveland Engine Plant.

Shown above is a battery of Baird Chucking Machines. They completely finish-turn the engine piston, and finish the oil ring grooves to size. Machines are automatically loaded from the conveyor and automatically discharge the pistons when they are completed. Operations are fast, continuous, and to close-tolerance machining.

The Baird 76H Chucker (7″-chuck, 6-spindle, horizontal machine) combines, in a single automatic indexing cycle, such operations as turning, facing, drilling, tapping, threading, grooving, and chamfering . . . if desired. Automatic electrical and mechanical safety devices prevent damage when setting up, when loading is not within cycle time, or when any motions are out of sequence.

Other valuable features are: easy access to all tooling, individual tool slides, individual spindle speeds, automatic chucking, maintained accuracy over a long service life.

If you require repetitive production of this nature . . . either hand load and unload, or entirely automatic . . . ask Baird engineers for details.

the **BAIRD MACHINE COMPANY**
STRATFORD • CONNECTICUT

200,000-lb. capacity Baldwin-Tate-Emery Mill Type Machine designed to facilitate routine production testing.

120,000-lb. capacity Baldwin-Tate-Emery Universal Machine equipped for research and development work.

BALDWIN BLH LIMA-HAMILTON

TESTING

BALDWIN

General Offices: P

NEW good-neighbor

It's a real pleasure to say "hello" and "best wishes" to our big, new neighbor just up the Delaware. In addition to a community pride at having the mammoth Fairless Works nearby, we have a personal pride in this Mill of Tomorrow.

Our technical skills—as reflected in our products—will play an important part in the operation of this big steel mill. For instance, the wide variety of Baldwin testing machines will ensure that the steels produced there will meet the highest standards of quality—just as the Baldwin testing machines, pictured below, are helping today in other United States Steel plants in Chicago, Pittsburgh and elsewhere.

If you are setting up a completely new plant or expanding testing operations in an existing plant, be sure and check with Baldwin. In this complete line, you'll find every machine you need for mechanical testing—SR-4® strain gages and devices, machines to test impact, creep, fatigue, universal machines up to 5,000,000-pounds, many others.

At Baldwin you'll find better testing machines, a wider variety of testing machines, more versatile testing machines. So write today!

EVERYTHING IS BIG AT THE FAIRLESS WORKS:

There are two batteries of 87 modern, by-product coke ovens each; two blast furnaces with combined annual capacity of 1,134,000 tons of pig iron; a combination slabbing and blooming mill. An 80-inch hot-strip mill; a billet mill; a bar mill with a size range from ⅜ to 2-inches; facilities to produce 281,000-tons of ⅛ to 4-inch pipe annually.

Baldwin-Sonntag Impact Testing Machine being used to study impact properties at low temperatures.

HEADQUARTERS

-LIMA-HAMILTON

Philadelphia 42, Pa. • Offices in Principal Cities

In Canada: Peacock Bros., Ltd., Montreal, Quebec

Air Conditioning and Refrigeration Survey

(*Continued from page* 61)

this case the capacity of the unit is two-million cu ft of air. Westinghouse Precipitrons are used in both installations.

Refrigeration for Mallory Tests

Low temperature equipment is used at the P. R. Mallory plant in Indianapolis, Ind., as a part of a temperature cycling test in the testing of vibrators, intervalometers and selector switches. These products are cycled from room temperature to minus 96 F and are held at this temperature for a sufficient period to insure that the parts are reduced to the 96 F point. Leeds & Northrup controlling and recording units continuously record the test. This is necessary to conform to Government requirements. A Webber freezer of nine cu ft is employed for the tests.

Close Dimensions in Willys Jet Production

At the Willys jet engine plant in Anderson, Ind., York air conditioning units are used in the areas for final inspection and machining of certain turbojet components. They are also employed in the gage inspection department. The equipment is necessary because of the uniform temperature which must be held so that there will not be a variation in the metals due to expansion or contraction.

Two Typhoon, five-ton capacity, air conditioning units are installed in the piston and piston pin fitting room at the Willys Toledo plant. These units provide a controlled temperature in a floor area of approximately 800 sq ft to insure uniformity of piston pin fits.

Conditioned Air for Studebaker's Jet Engines

Piston and piston pin fitting is done in an air conditioned area at Studebaker. Here a York unit keeps the room temperature at a constant 72 F.

In Chicago, the firm is operating an air conditioned plant for the production of jet engine parts. Conditioned air for this application is desirable from the standpoint of cleanliness. Three York units of 1150-ton capacity are utilized.

Douglas Uses Portable Refrigeration

A rather unique system of portable refrigeration has been established at the El Segundo Div. of Douglas Aircraft. This system has been encouraged by the extensive use of harder aluminum alloys. The portable electric units, moved in trains, are often banked around presses and other fabricating equipment. Primarily, these boxes are used to retain the "as quench" conditions after heat treatment of aluminum. The refrigerators, according to plant officials, have proved very efficient and have replaced the use of dry ice for these purposes. All of the boxes are Douglas designed.

Cold boxes are used also for freezing rubber and other soft plastic

(*Turn to page* 124, *please*)

Air Conditioning and Refrigeration

(*Continued from page* 122)

parts so that close tolerance holes can be easily drilled. A refrigeration usage recently adopted is for a caulking or sealing compound for all exterior and interior skin or structure laps subject to fumes or moisture entering crew compartments. The compound found most desirable is one which must be kept at a very low temperature, and here small boxes conveniently located at point of usage are found to be most advantageous.

Movable Air Conditioned Room at P & W

A unique portable air-conditioned room is used at Pratt & Whitney, Div. Niles-Bement-Pond Co., West Hartford, Conn., for the construction of high precision jig borers. The room is 17 ft wide, 20 ft long, with a 14 ft ceiling, and is made of wood and steel with Johns Manville four in. thick Transite for the walls. A standard garage door is utilized for the opening.

Mounted on 17 Bassett spring casters, the room can be easily moved by a few men or a medium-sized industrial truck. Refrigeration in the portable unit is supplied by a Carrier air conditioner of 10-ton capacity, and the room is held to a temperature of 72 F plus or minus one deg.

The room was built, and is currently being used, for Pratt & Whitney's largest size high precision jig borer. To make certain that the machine tool would be within prescribed tolerances, the company decided that the jig borer must be inspected during manufacture and final inspection at a practically constant temperature.

Clean Air at Northrup

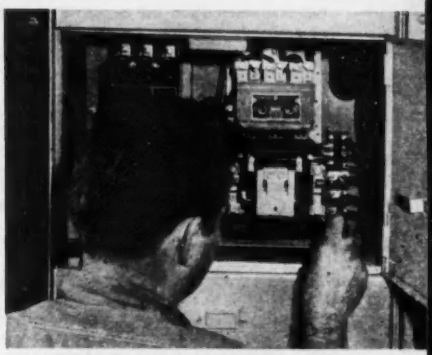
In the processing of plastic material at Northrop Aircraft's main plant at Hawthorne, Calif., cleanliness is a critical factor and the use of air-conditioned rooms is considered essential. These rooms are also a requirement in the cementing of Dow Styrofoam to material surfaces. In Northrop's test laboratory, a completely dust-proof room, measuring approximately 20 ft by 40 ft is in operation. This air-conditioned room is used for the testing of flight-test instruments and recording equipment.

At the company's Anaheim Div., optimum atmospheric conditions are maintained for the assembly of U. S. Army Ordnance Corps optical range finders. A 30,000 sq ft dust-free and completely air-conditioned final assembly room is in use. Humidity and temperature are controlled in this chamber within the close tolerances necessary to optical manufacturing, inasmuch as dust, grease or unfavorable temperature conditions can cause distortion in the glass. Temperature is maintained within a two-deg variance from 72 F, and humidity is kept at an average of 42 per cent. The large room is maintained under slight pressure to prevent entrance of dust-laden air.

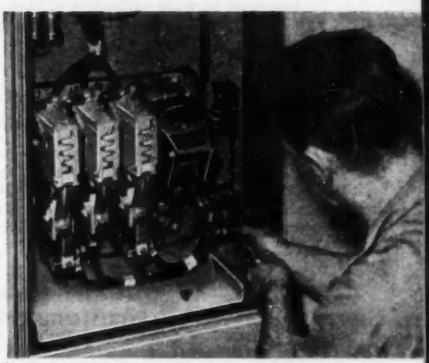
Rivets, sheets, extrusions—in fact, any of the heat treatable aluminum alloys at Northrop Aircraft—are refrigerated following the quenching process and then stored for future use.

(*Turn to page* 126, *please*)

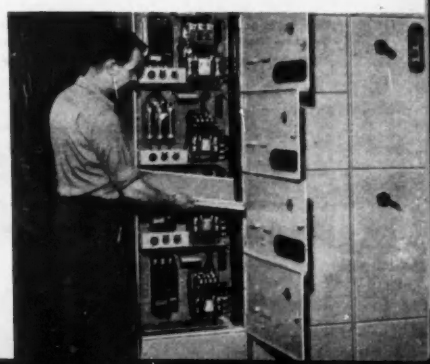
EASY TO INSTALL AND INSPECT. Interchangeable units; main bus completely accessible; incoming line connections are easily made.



EASY TO WIRE. Four-inch wiring trough; components accessible from all sides; front-connected starters; doors swing more than 90°.



EASY TO SERVICE. Units are easily disconnected from bus and locked in test position (above). Barriers between units are easily removed to facilitate wiring (below).



FORD MOTOR COMPANY OFFICIALS INSPECT THE INTERCHANGEABLE UNITS OF THE . . .

New G-E Motor Control Center

Since January, over 10,000 men from production and management of leading industries (see above) have taken a thorough look at the latest equipment for the centralized control of a-c motors up to 200 hp. Their reports indicate enthusiastic approval of what they saw. Here's why:

VERSATILE. Because units are easily interchangeable without waste space, a variety of arrangements can be made. For example—two Size 1 or 2 starter units require the same space as a Size 1, 2, or 3 reversing starter.

ACCESSIBLE. A four-inch continuous wiring trough provides ample wiring space. Components are mounted on an easy-to-handle frame and accessible from all sides when lifted from cabinet. Starters are front-connected. Master terminal boards can be swung out of compartment for extra working space around conduit.

PROTECTED. Will withstand 25,000 amperes RMS short-circuit current, substantiated by certified Laboratory tests.

For more information on this new G-E motor control center, contact your nearest G-E apparatus sales office or write for Bulletin GEA-4979A today. *General Electric Company, Schenectady 5, N. Y.* 710-42

GENERAL ELECTRIC

Air Conditioning

(*Continued from page* 124)

Conditioned Air at Curtiss-Wright

In wind tunnel research at Curtiss-Wright Corp., at relatively high Mach numbers, air flowing through the test section must be dehumidified to within certain limits to eliminate any disturbance effects of condensation. Since the Wright Aeronautical Div. supersonic tunnel (4.5 in. by 5 in. test section) operates at a test Mach number of 2.86 and a tunnel stagnation temperature of 100 F, the dryers in the closed tunnel system must be capable of drying 400 cfm of saturated ambient air from an initial condition of 90 F dry bulb and 70 F dewpoint to a final dewpoint not in excess of plus 20 F.

A Pittsburgh Lectrodryer, Type BWC-750, with steam reactivation is presently being used in the supersonic tunnel.

At some point in the closed tunnel system, usually from the high pressure side of the tunnel blower system to the low pressure side a certain amount of tunnel air is continually by-passed. The moisture in the air when passed through the Lectrodryer will adhere to the large surface exposed by the activated alumina with which the adsorber towers are filled. This adsorption process takes place without changing the adsorbent chemically or physically. After the adsorbent has taken up its fill of moisture, the water can readily be driven off by applying heat at the proper temperature and at the same time, passing a stream of air, 3000 cu ft per hr through the Lectrodryer to sweep out the released moisture. The activated alumina then is cooled to about room temperature and is ready for another drying cycle. This alternate picking up of moisture by the activated alumina and its reactivation by heat can under proper conditions, be continued indefinitely without deterioration of the material.

Lockheed Expands Use

Lockheed Aircraft Corp. is now expanding its use of refrigeration. A 5000 cu ft refrigerator, just installed, cools 2500 lb of aluminum from room temperature to −20 F within two hr. The unit measures 40-ft long, 12-ft wide and 10.7-ft high, and uses a 30 hp compressor.

(*Turn to page* 130, *please*)

the extra BRAKING ECONOMY proven here...

High in the Rockies Crossing the Continental Divide.

MORE PROFITS

Cost Cutting Bendix-Westinghouse Air Brakes Reduce Downtime and Repairs on Rugged Mountain Runs!

When a braking system proves itself for **safe, dependable performance and low operating costs** day after day over one of the toughest trucking routes in the country its got to be good! And that's exactly what Bendix-Westinghouse Air Brakes do on hundreds of trucks operating over Colorado's Berthoud Pass which cuts through the rugged Rocky Mountains at altitudes exceeding 11,000 feet. Here these **mighty brakes** are put to a grueling test—mile after mile of steep downgrades and sharp, tight curves that require almost constant braking application. Yet here, actual fleet records testify year after year that Bendix-Westinghouse Air Brakes pay off not only with **peak performance, positive control and utmost reliability,** but with actual hard cash savings on maintenance, parts replacement costs and reduced downtime. That's why, no matter what type trucks or busses you build and whether they're designed for operation across town or cross country, you can give your customers the most in performance and profits by specifying the **brakes proven for economy**—Bendix-Westinghouse, the world's most tried and trusted air brakes!

Bendix-Westinghouse

THE WORLD'S MOST TRIED AND TRUSTED

AIR BRAKES

BENDIX-WESTINGHOUSE AUTOMOTIVE AIR BRAKE COMPANY • ELYRIA, OHIO • BERKELEY, CALIF.

You'll always get Profitable Methods plus Advanced Machine Design ... from

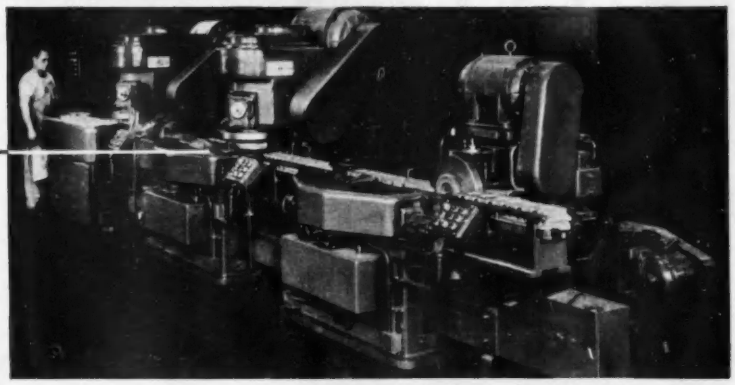
SUNDSTRAND "Engineered Production"

Here are some representative examples of machine tools and services offered by the Machine Tool Division of Sundstrand. Standard basic machine designs and units, coupled with methods engineering assistance, have resulted in many cost-saving Sundstrand installations. If you have metal working operations in your plant and are interested in lowering manufacturing costs, call in a Sundstrand representative. He'll be glad to assist you in obtaining more economical methods. There is no obligation for this service.

Magnetic Power Clamping For Heavy Milling Cuts

Sundstrand Model 33 Rigidmil equipped with a Sundstrand Magnetic Fixture. Parts machined include tool blocks, cam bars, tool slides, motor brackets, etc. Lot sizes vary from 1 to 25 pieces, and time reduction averages 50% over former method. In addition to saving time through the elimination of mechanical clamps, these magnetic fixtures save the costs of special jigs or fixtures.

Multi-Station Automatic Transfer Rigidmil

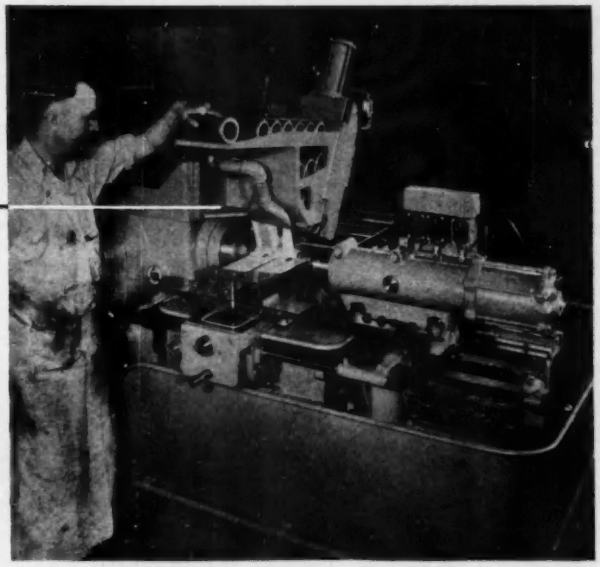


This special transfer type Rigidmil has three milling stations, one turn-over, an idle station and loading and unloading stations for milling top, bottom, and both sides of cast iron cylinder heads. This type workpiece adapts itself to automatic clamping and transfer between work stations. All stations controlled from the master control button panel or individually from the station button control panels. Cylinder heads are shuttled from station to station by the movement of the milling heads.

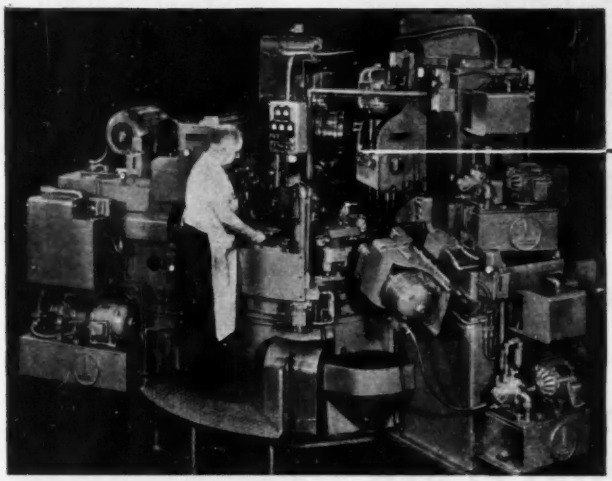
SUNDSTRAND

RIGIDMILS • AUTOMATIC LATHES • HYDRAULIC EQUIPMENT

Hopper Loading for Production Turning



This standard Sundstrand Automatic Lathe is equipped with a hopper loading device for automatically loading and unloading track link bushings. The operator's only duties are to fill the hopper and the part is automatically loaded, turned and ejected into the unloading chute. Machine will run automatically with one filling of the hopper for 12-1/2 minutes.



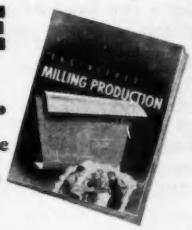
Multi-Station Automatic Indexing Machine

Special Sundstrand Five Station Process Machine for milling port faces and angle pads, drilling port faces and counterboring angle pad of manifold part. This irregularly shaped part is located and clamped at station #1 and then indexed thru the remaining four work stations to complete the machining with one handling of the workpiece. Production is approximately 115 pieces per hour.

FREE

Additional Data..

Additional data on any or all of these machines is available. For complete set of literature ask for bulletin 226.



SUNDSTRAND

SUNDSTRAND
Machine Tool Company
2571 Eleventh St. Rockford, Ill., U.S.A.

DRILLING AND CENTERING MACHINES • SPECIAL MILLING AND TURNING MACHINES

Air Conditioning

(*Continued from page* 126)

Production parts being processed through the unit include components for Navy P2V Neptune patrol bombers, R7V-1 transports and Air Force F-94C Starfires. A 34-ft long overhead door on the refrigerator permits entry of parts as large as Super-Constellation inner wing panels, largest integrally-stiffened aircraft parts produced.

A walk-in size refrigerator, eight ft by eight ft by 12 ft, is used on the company's jet aircraft production lines at the Burbank, Calif., plant. Still another application of refrigeration is the use of a cold box unit, about 18-ft long, mounted on casters for easy movement to any required area on the production line.

Air-conditioning is a requirement at Lockheed in areas where supercharger high speed bearings for aircraft are installed and tested. After the installation of air-conditioning equipment for this particular assembly area, bearing failures were claimed to be greatly reduced. Company engineers attribute this to the dust-free working area created by the air-conditioning installation.

Low Temperature Equipment at Muncie

A Webber low-temperature freezer installation in the Muncie Gear Works, Muncie, Ind., is utilized for the shrinking of nozzle inserts for fitting in the nose of rockets. This freezer has a temperature range from ambient to minus 125 F.

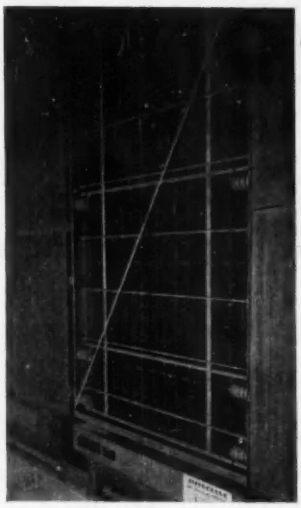
The rocket inserts are loaded in the top of the freezer, which holds 7000 nozzle inserts, and are removed at an opening that is convenient to the assembly line. Shrinkage is great enough to permit assembling the parts by hand pressure.

According to the company, this method has resulted in higher production due to a decrease in spoilage.

Gas Dehydration at M-H

At the new aeronautical division plant of Minneapolis Honeywell Regulator Co., chilling equipment is utilized for the production of gyro compasses. Two types of gases are used in the gyros—hydrogen and helium and before these are pumped into the

(*Turn to page* 132, *please*)



View of the electrostatic filter in use at Allison Div., GM, that cleanses the air before it passes to heating and cooling coils. These filters will remove dust particles as small as 0.00002 in. diam. Several of the distribution baffle doors are open to show the ionizing section of the filter.

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Here's the library of Reynolds Technical Books and Films . . . comprehensive, illustrated handbooks and sound-color motion pictures on aluminum design and fabrication. Chances are you need these handbooks on your desk for ready reference in your design and engineering work. And, to put increased interest in training programs and at your technical society meetings, you'll want to show the 16mm, sound-color films*. Select the handbooks and films that fit in with your work and send for them today.

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- Fastening Methods for Aluminum
- Forming Aluminum
- Machining Aluminum Alloys
- Heat Treating Aluminum Alloys
- A-B-C's of Aluminum
- Metals Weight Slide Rule

†Handbooks are free when requested on business letterhead otherwise the price of each book is one dollar.

16MM COLOR-SOUND FILMS‡

- **SHAPE OF THINGS TO COME.** Interesting description of the aluminum extrusion process and the design opportunities it provides. Running time 30 minutes.
- **TALE OF THE POWDERED PIG.** Developments in aluminum powders and pastes including their application in protective and decorative coatings. Running time 22 minutes.
- **PIGS AND PROGRESS.** The complete story of aluminum from mine to finished products. Covers all forms of aluminum. Running time 26 minutes.

‡Films are loaned without charge when requested on business letterhead

Complete index of Reynolds literature and films on aluminum design and fabrication also available.

Order from REYNOLDS METALS COMPANY
2587 South Third Street, Louisville 1, Kentucky

REYNOLDS ALUMINUM

MODERN DESIGN HAS ALUMINUM IN MIND

New Pneumatic System for Jet Aircraft

A new pneumatic system for supplying auxiliary power for jet aircraft has been announced by the General Electric Co.'s Aircraft Gas Turbine Div.

Designed to supply either electric or hydraulic power, the pneumatic system is driven by air from the jet engine compressor. Each unit is simply constructed and consists of a turbine, reduction gears, and controls. Drives for alternators up to 60 kva are in prototype production.

For furnishing electric power the alternator drive consists of a single-stage, variable-area, axial-flow turbine with reducing gears. The gear assembly housing incorporates the drive for the governor and lube oil pumps, and also contains an integral oil cooler and oil supply.

For furnishing hydraulic power, the hydraulic pump unit consists of a simple, high-speed radial inflow turbine, with throttling control, driving a 3000 psi, variable displacement hydraulic pump through double-reduction gearing. Drives are also provided in the gear box for the governor, the lube oil and scavenging pumps, and a fan for the oil cooler, all built into the integral fluid reservoir. The main hydraulic pump, the lube oil pump, and the cooler are enclosed in the reservoir, and are submerged in oil during all normal operating conditions.

GE engineers state that the big reason for the reliability of these new units is the fundamentally simpler method of generating auxiliary power. On a multi-engine plane, air valves at the proper locations plus appropriate ducting allow air to be supplied by any combination of engines. Thus a power plant failure would not mean loss of accessory operation because one engine could supply power for all accessory needs.

By a judicious arrangement of units, the pneumatic system is believed to be much less vulnerable to battle damage. By proper design of air ducts, sufficient capacity can be provided to permit at least part load operation in event of a bullet puncture.

The pneumatic packs can be located in any part of the airplane so that drag effects resulting from bulging units on the engine nacelle can be eliminated.

Sundstrand Net Increases

Sundstrand Machine Tool Co. in the nine months ended Sept. 30 earned $1,466,574 after provision for income taxes, compared with earnings of $936,125 after taxes in the corresponding nine months a year ago.

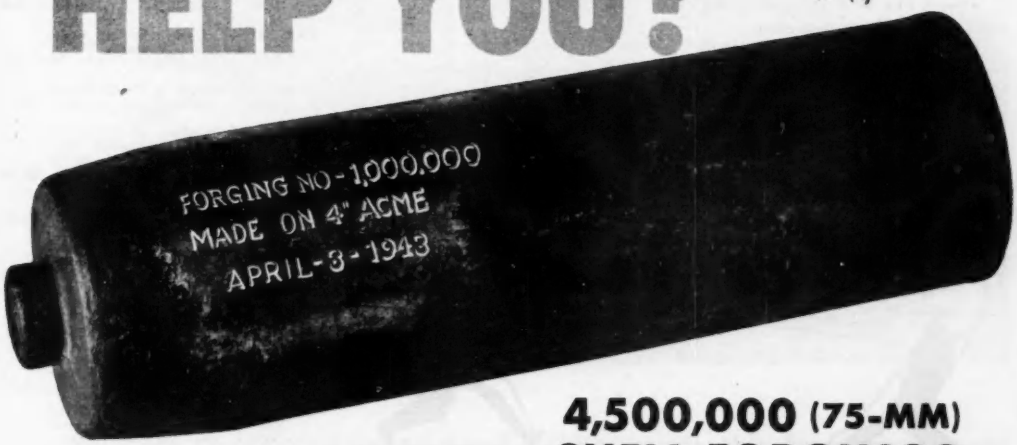
Based on 470,320 shares of common stock currently outstanding, the latest nine-month earnings equalled $3.12 a share, compared with $1.99 a share in the like period a year before. On the basis of 376,256 shares then outstanding, earnings for the first nine months last year were equal to $2.49 a share.

Air Conditioning

(*Continued from page* 130)

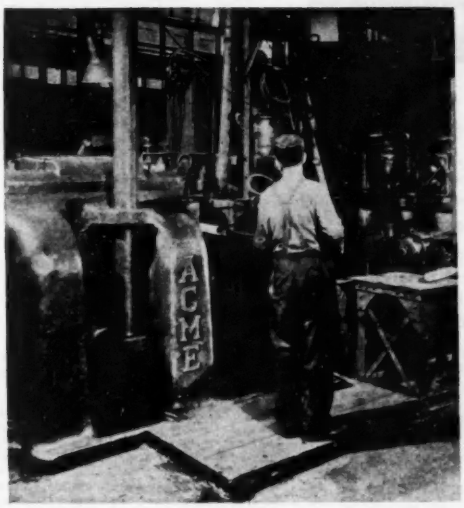
gyro units they must be free of moisture. Therefore, the gases are pumped through a Sub-Zero chilling machine at a temperature of —135 F for dehydration. Inside the machine are 225 ft of coil for each gas. As the two gases run through these coils moisture condenses on the coils which are periodically removed and cleaned. The machine, 1½ ft diam by 2½ ft deep, has a thermal capacity of 500 Btu per hr.

WILL THIS HELP YOU?



4,500,000 (75-MM) SHELL FORGINGS

were produced on this Acme 4" model XN Forging Machine during the second world war at International Harvester Company. Each completed forging required seven operations —that means seven million strokes of the machine for every million completed forgings. Army Ordinance specifications were maintained throughout the entire contract run. The machine is still in operation today.



Perhaps this outstanding performance will help you in selecting forging equipment for YOUR needs where continuous production of accurate forgings is a MUST.

Acme Model XN Forging Machines are built in sizes from 1" to 5½". Bulletin XN-M gives complete details.

THE HILL ACME COMPANY

ACME MACHINERY DIVISION • 1209 W. 65th St., Cleveland 2, Ohio
ESTABLISHED 1882

"ACME" FORGING • THREADING • TAPPING MACHINES • ALSO MANUFACTURERS OF "HILL" GRINDING AND POLISHING MACHINES
HYDRAULIC SURFACE GRINDERS • "CANTON" ALLIGATOR SHEARS • PORTABLE FLOOR CRANES • "CLEVELAND" KNIVES • SHEAR BLADES

CALENDAR

OF COMING SHOWS AND MEETINGS

Society for Experimental Stress Analysis, Annual Meeting and Exhibition, Hotel McAlpin, New York, N. Y. .....Dec. 3-5

National Standard Parts Association Congress, Ambassador Hotel, Atlantic City, N. J. .....Dec. 8-9

Automotive Service Industries Show, Atlantic City, N. J. .....Dec. 10-13

2nd Convertible Aircraft Congress, Franklin Inst., Phila., Pa. ....Dec. 12

1953

43rd National Motor Boat Show, Grand Central Palace, New York, N. Y. .....Jan. 9-17

SAE Annual Meeting, Sheraton-Cadillac Hotel, Detroit, Mich. Jan. 12-16

Brussels Automobile & Truck Show, Brussels, Belgium. Jan. 17-28

Plant Maintenance Show, Public Auditorium, Cleveland, Ohio Jan. 19-22

Monte-Carlo Rally, Europe .....Jan. 20-27

30th International Automobile Show, Pacific Auditorium, Los Angeles, Calif. .....Jan. 30-Feb. 8

Western Computer Conference, Hotel Statler, Los Angeles, Calif. .....Feb. 4-6

National Transport Vehicle Show and Fleet Maintenance Exposition, New York, N. Y.....Feb. 24-27

Pacific Automotive Show, Civic Auditorium, San Francisco, Calif. .....Feb. 26-Mar. 1

American Society for Testing Materials, Spring Meeting, Detroit, Mich. .....Mar. 2-6

SAE National Passenger Car, Body, and Materials Meeting, Sheraton-Cadillac, Detroit, Mich...Mar. 3-5

Geneva Automobile & Truck Show, Geneva, Switzerland ...Mar. 5-15

National Association of Corrosion Engineers Ninth Annual Conference and Exhibition, Hotel Sherman, Chicago, Ill.....Mar. 16-20

German Vehicle Show, Frankfort, Germany .....Mar. 19-29

27th Automobile Show, Civic Auditorium, San Francisco, Calif. Mar. 21-29

Eighth Western Metal Congress, Pan-Pacific Auditorium, Los Angeles, Calif. .....Mar. 23-27

International Magnesium Exposition, National Guard Armory, Washington, D. C. .....Mar. 31-Apr. 2

2nd Annual International Motor Sports Show, Grand Central Palace, New York, N. Y..Apr. 4-12

Auto-Lite Easter Automobile Show, Waldorf-Astoria, New York, N. Y. .....Apr. 6-11

Annual Turin Automobile Show, Turin, Italy .....Apr. 22-May 3

British Industries Fair, London and Birmingham, England..Apr. 27-May 8

Fifth Materials Handling Exposition, Convention Hall, Philadelphia, Pa. .....May 18-22

American Society for Testing Materials, Chalfonte-Haddon Hall, Atlantic City, N. J.....June 29-July 3

Eighth National Instrument Conference and Exhibit, Chicago, Ill. .....Sept. 21-25

BOOKS . . .

THE DEVELOPMENT OF ECONOMIC THOUGHT, *by Philip C. Newman, published by Prentice-Hall, Inc., 70 Fifth Ave., New York, N. Y. Price, $6.65.* This interesting work treats the growth of economic theory from the period preceding Adam Smith through the years up to and including the rise of Keynesian economics. Among the eras covered in the book's pages are those of classical economics, reactions against classicism, neo-classical and equilibrium economics, and the reaction against neo-classicism. In addition to explaining fully the concepts of each economic school, the author endeavors to show the influences which social and political factors had upon its growth and popularity. The light which the book sheds on the ways and means by which the thinkers of the past sought to reconcile economic fact with theory and vice versa should aid the reader in gaining a fuller understanding of the background from which sound business management practices of today evolved.

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ELECTRUNITE Steel Tubing made this farm equipment better at lower cost . . .

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Does this give you some ideas about *your* product . . . whatever it may be? Republic ELECTRUNITE Steel Tubing can keep your product strong yet make it lighter, make it better at lower cost, more attractive to the man who uses it . . . and who buys it. We'd like to tell you our ideas.

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MACHINERY INDUSTRIES

(*Continued from page 73*)

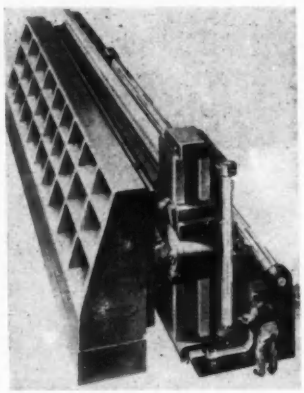
parts of the press from the work and furnish the stripping force is 6000 tons. Even the knockout cylinders—which push the work out of the dies—have capacities of 250 tons.

Forging Plant Operation

In explaining the proposed operation of the two large Bliss presses, Mr. Moore, of the Newark plant, which will be operated by the Kaiser Aluminum and Chemical Co., stated that aluminum and magnesium forgings up to 2000 sq in. in longitudinal area would be produced. He went on to say that the billets for these forgings are to be cut on large size circular saws having a blade diameter of five ft and capable of sawing material up to 24 in. diam. Another extremely important item in a plant of this type are the furnaces. They must supply the presses with adequately heated stock in sufficient capacity to keep the presses as near 100 per cent operation as practical. In order to have flexibility and insurance against delays where large quantities of materials are involved, the total requirements of the plant are to be divided into furnaces of reasonable capacity for economical operation. Size of the furnaces at the installation will be approximately 55 ft long by 24 ft wide overall, and will weigh approximately 1 million lb each, and each will be capable of carrying a load of 100,000 lb. Temperature will range from 250 to 1000 F depending on alloy used and the particular operation involved, and they will be controllable to within plus or minus five deg.

Machines for Large Forgings

Establishment of a special machinery division—where the building of special machine tools weighing as much as 250 tons is contemplated—has been announced by Kearney & Trecker Corp., Milwaukee, Wis.



Projected design of a Kearney & Trecker large bed-type milling machine for milling integrally-ribbed aircraft skins. The machine is approximately 50 ft long, 18 ft high, 27 ft wide. Table width nine ft —approximate weight 1'0 tons. Large machines will be built in the company's new plant.

The newly formed division will have its operations centralized in a modern manufacturing plant to be constructed on a 38-acre site. Of single story design, the new plant will have approximately 193,000 sq ft under one roof, 20,000 of which will be set aside for office and record storage purposes.

(*Turn to page 140, please*)

For Protective Coverings and Special Parts of Flexible Materials* *Engineered to Your Specifications*— CALL ON kennedy

Established in 1906, Kennedy has grown up with the automotive industry . . . designing and producing special parts and protective coverings of flexible materials for many uses . . . solving complex individual problems as they arose . . . meeting the most rigid "on-time" delivery demands.

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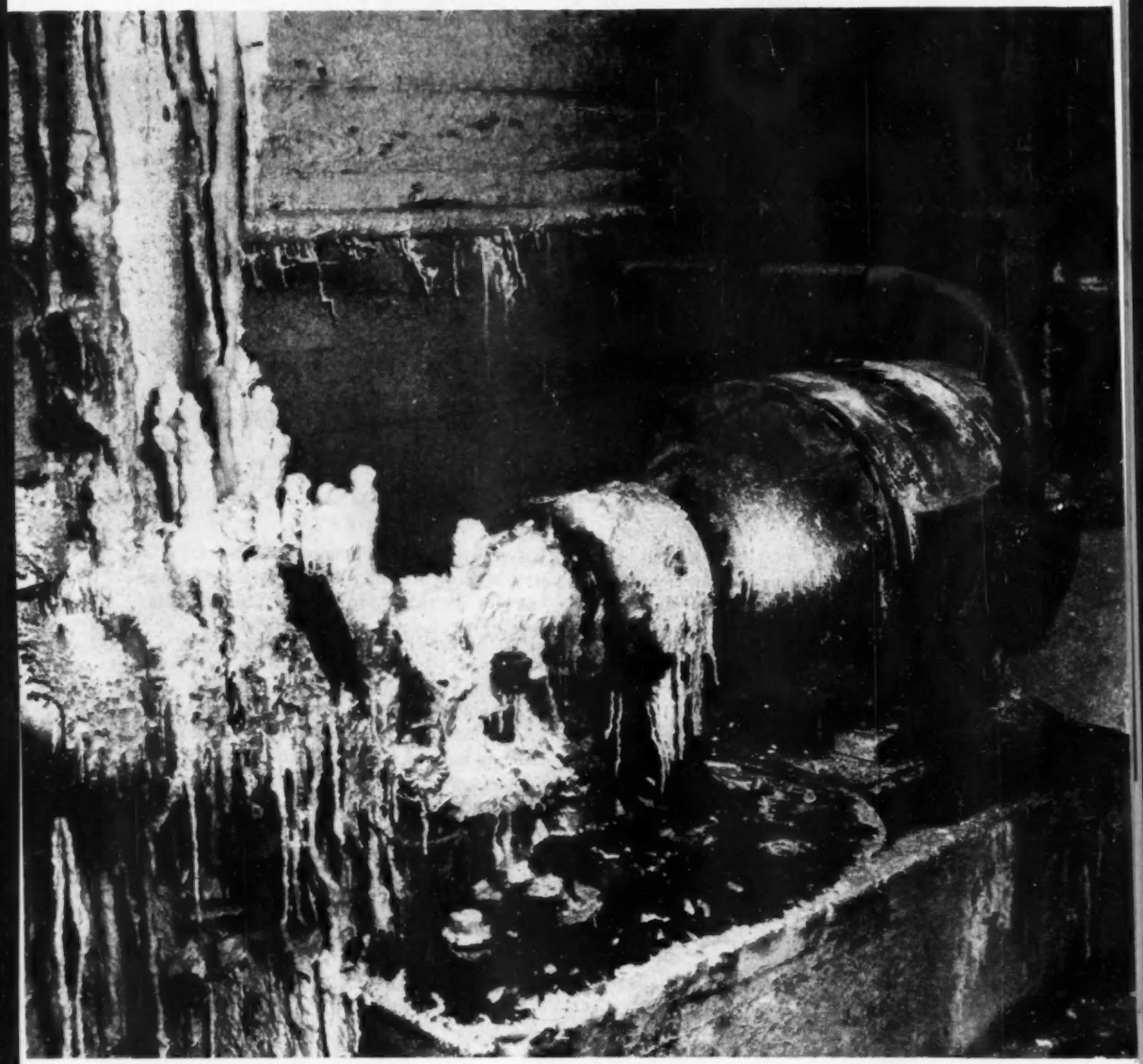
WHEN JOBS ARE TOUGH



CORROSIVE ATMOSPHERE doesn't bother this standard, "off-the-shelf" Tri-Clad motor. Totally enclosed, fan cooled, it runs 12 hours a day, six days a week, driving a flash cooler pump under tough conditions in a chemical plant.

GENERAL ELECTRIC

INDUSTRY DEPENDS ON G-E TRI-CLAD MOTORS

REG. U.S. PAT. OFF.

Here are three typical tough jobs being done safely, economically, and without interruption, by G-E Tri-Clad motors. They help show why more than 10,000,000 horsepower of G-E Tri-Clad motors are serving American industry today.

WIDEST VARIETY

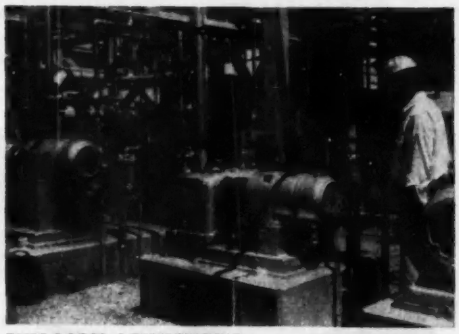
With the widest selection of standard motors obtainable anywhere, the Tri-Clad motor line offers ratings up to 2000 hp; all types of enclosures; gear motors, brake motors, and adjustable-speed drives—plus many other mechanical and electrical modifications to meet your requirements.

TRIPLE PROTECTION

You get triple protection with *every* Tri-Clad motor—against physical damage, electrical breakdown, and operating wear and tear. Completely enclosed bearings last longer because they can be relubricated if necessary—and *without shutdown!* For specific product information, use the coupon below, or contact your nearby G-E Apparatus Sales Office, authorized G-E Agent or Distributor.

IMMEDIATE DELIVERY

Most standard G-E Tri-Clad motors are available immediately from stock. And the most complete sales and service network in the motor industry assures you prompt service by trained specialist and application engineers, for all your motor problems. General Electric Co., Schenectady 5, New York. 752-16



EXPLOSIVE ATMOSPHERE dangers are avoided by using standard explosion-proof Tri-Clad motors, such as these gear-motors driving water and hydrocarbon pumps in an oil refinery.

OIL, MOISTURE, ABRASIVE DUST can't stop this totally-enclosed Tri-Clad motor, operating below the strip in a cold strip steel mill. Motor is completely protected inside and out.

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Name.....

Firm.....

Address.....

City.....Zone.....State.....

MACHINERY INDUSTRIES

(*Continued from page* 136)

According to Francis J. Trecker, president of the firm, the decision to build the plant was made following many months of careful study by the Munitions Board and various Government security planning agencies which have approved and certified the need for such facilities as a necessity for national defense requirements.

Explaining this, Mr. Trecker said: "Following World War II, military missions made intensive studies of the production methods of German government manufacturers. They found the Germans had advanced far beyond Americans in forging of large sections for aircraft manufacture. Forging press programs in Germany used presses having capacity as high as 50,000 tons, where American efforts had been limited to a maximum of 15,000 tons.

"The military mission recommended to the Joint Chiefs of Staff that American aircraft manufacturers use giant presses for the making of large plane components. This recommendation evidently resulted in the $400 million order by the Government for huge presses, plants, and allied equipment.

"Presses of such size meant a corresponding need for new machine tool capacity to machine the die blocks, and the gigantic parts forged from them. The forged parts would be 15 to 20 ft long and ½ as wide."

Mr. Trecker stressed that although the defense department would have first call upon the production of the new plant, "a great share of the production in the immediate future will be available for non-defense production."

Tool Sales Highest in Decade

Shipments of machine tools in September were the highest for any month in more than 10 years. Shipments for the month are estimated at nearly $110 million, reducing the ratio of unfilled orders to the demonstrated production rate to 11.8 to 1. New orders fell off in September to an index of 300.3 from 309.1 in August and the year's high of 374.6 in July. NMTBA reports that the order backlog is spotty with boring machines, lathes, and grinding and milling equipment in heavy demand, but with other categories slowing up markedly and with manufacturers of some of these latter items cutting back production.

NMTBA Elects Officers

Swan E. Bergstrom, vice-president, The Cincinnati Milling Machine Co., Cincinnati, Ohio, was elected president of the National Machine Tool Builders' Association at its 51st Annual Meeting held at White Sulphur Springs, W. Va.

Herbert L. Tigges, executive vice-president of Baker Brothers, Inc., Toledo, Ohio, was elected 1st vice-president; and M. A. Hollengreen, president of the Landis Tool Co., Waynesboro, Pa., was elected 2nd vice-president and director. Francis J. Trecker, president, Kearney & Trecker Corp., Milwaukee, Wis., was elected treasurer.

New NMTBA directors elected, in addition to Mr. Hollengreen, were: J. C. Cotner, president, The Hydraulic Press Manufacturing Co., Mount Gilead, Ohio, and Alan C. Mattison, president, Mattison Machine Works, Rockford, Ill.

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Model 2000S

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- FREQUENCY CHANGERS
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- SATURABLE CORE REACTORS
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Men who use instruments prefer Sorensen AC Line Regulators because of regulation accuracy, clean waveform, insensitivity to frequency fluctuation, load range.

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Men who pay for instruments prefer Sorensen AC Line Regulators because of reasonable price and the fact that there are no extras for installation and special wiring.

ELECTRICAL SPECIFICATIONS

Models available (numbers indicate VA capacities)	Input	95-130 VAC, 1φ, 50-60~; 190-260 VAC in "-2S" models
	Output	115 VAC ±5%; 230 VAC in "-2S" models
150S 250S	Regulation accuracy	±0.1% against line or load
500S (-2S also) 1000S (-2S also)	Distortion	2% - 3% maximum
2000S 3000S (-2S also)	P. F. range	Down to 0.7
5000S (-2S also) 10000S (-2S also)	Load range	0 to full load
15000-2S	Miscellaneous	Models 150S, 250S, 500S, 1000S, 5000S, 10000S, and 15000-2S are self-contained. Cabinets available for others.
1001	Regulation accuracy 0.01%, load range 0 - 1000 VA, output 115 VAC ±5%, other characteristics similar to those given above.	

* ISOTRONIC=Regulation and control of voltage, current, power, and frequency by electronic means.

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New Products

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(*Continued from page* 80)

The generator is said to be especially useful as a rate device in servo systems, since it is small, light-weight, and has sufficiently high output to provide good sensitivity.

Standard mounting provisions include the synchro type and/or tapped holes as used on standard "Moto-Mite." Units can be furnished with a plain shaft extension or with a pinion. Terminals or leads as required may be supplied. *Globe Industries, Inc.*

Circle P-9 on page 81 for more data

Tubeless Tire

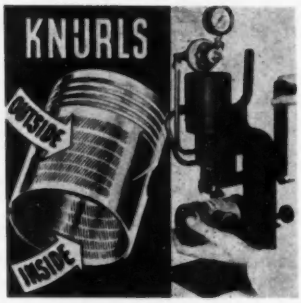
Specifically developed for higher speeds, a tubeless passenger car tire incorporates racing-tire construction principles. It is said to have successfully passed outdoor road tests at sustained speeds at well above 110 mph. *Firestone Tire & Rubber Co.*

Circle P-10 on page 81 for more data

Piston Knurlizing Method

An improved method of knurlizing pistons, called "Lubri-Knurl," has reportedly been developed to correct collapsed pistons more effectively.

The machine which performs this operation is said to knurl pistons on the inside, as well as on the outside, in order to increase piston diameter better. Results are said to be longer-lasting and more accurate.



In addition to correcting piston collapse, the "Lubri-Knurl" method of piston expansion is also claimed to provide improved piston lubrication during the early stages after a motor overhaul. The ridged pattern impressed into the piston by the "Lubri-Knurl" machine produces small "oil trenches," which are said to accumulate greater quantities of oil, thereby providing improved lubrication for pistons and cylinder walls.

It is also stated that because of the fact that the piston is knurled both inside and out, "Lubri-Knurl" produces a more permanent method of piston expanding. According to the company, the process is effective on all types of aluminum or cast-iron pistons. *Ramsey Corp.*

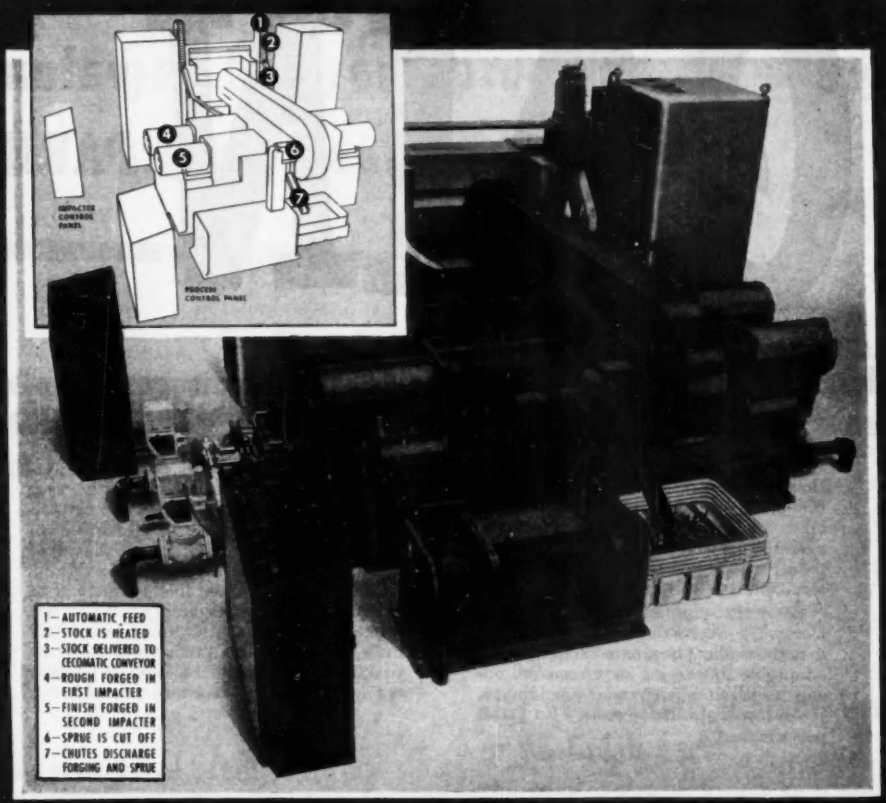
Circle P-11 on page 81 for more data

Resistor Spark Plug

Now available is a standard spark plug with a 10,000-ohm resistor built into the insulator to provide greater efficiency and longer life, according to the manufacturer. The resistor is said to cut off the unused tail-end portion of the spark discharge and thereby eliminate one of the chief causes of electrode erosion.

This also reportedly permits wider-than-standard gap settings to give improved engine performance and

(*Turn to page* 146, *please*)



A new method for the automatic mass production of "drop forgings" is announced by Chambersburg Engineering Company.

The method is called Impacting; the process (illustrated above) the Cecomatic Forging Process.

The Chambersburg Impacter, a new and unique type of hammer, is the basic tool of Cecomatic Forging.

CHAMBERSBURG ENGINEERING CO. • CHAMBERSBURG, PA.

GAIN valuable PARKER

Add durability to paint and control corrosion with BONDERITE

A dozen things you use every day are Bonderite-protected. Bonderite, under the paint on automobiles, appliances, office and industrial equipment, guards against rust and corrosion, anchors the paint, adds years to the appearance and service life of the finish.

Bonderite, applied by spray or immersion, converts the surface of metal to a nonmetallic phosphate coating. It is adaptable to varying requirements, operates with simplicity and dependability. It is low-cost, adds greatly to paint performance.

Add maximum corrosion resistance with PARCO COMPOUND

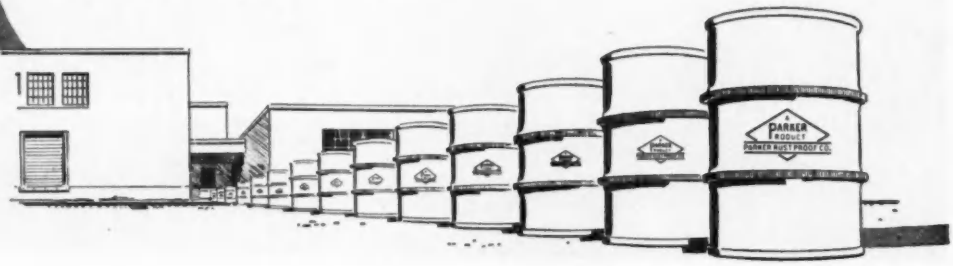
Iron and steel gain most effective protection against rust when treated with Parco Compound. Creates a nonmetallic crystalline phosphate coating over all surfaces of the product treated. Size and shape of product makes no difference—anything which can be immersed in the tank can be treated. Tools, springs, brackets, hardware, ornamental iron, plates, nuts, bolts, and nails are among the hundreds of items on which Parco Compound is used. It's industry's standard rust-resistant product.

Greater efficiency, economy in cold forming of metals with BONDERITE and BONDERLUBE

This is the combination of Parker Products which have put many "problem draws" into production routine. The nonmetallic Bonderite coating—used for years in tube mills for its ability to hold lubricants, minimize galling, lengthen tool and die life—joins with scientifically compounded Bonderlubes. This combination allows deeper draws, more severe extrusions. Saves time, money and materials. Used in manufacture of shell cases, shafts, gears, etc.

Get jet black corrosion resistant coating with PARCO BLACK

Jet black color and effective corrosion resistance from a single bath! Parco Black is not a dye, but chemically converts the surface of iron and steel to produce the protective coating. It is safe, simple, easily controlled. Products to be treated are immersed in a low temperature (about 180°) bath for a few minutes. Corrosion resistance of Parco Black is as much as ten times that of conventional "blacks."



advantages for your products by using a metal surface treatment . . .

Get increased wearing quality on friction surfaces with PARCO LUBRITE

This Parker product creates a nonmetallic phosphate coating on friction parts and bearing surfaces. Its action is to prevent metal-to-metal contact, hold lubricant, prevent galling and scratching. Smooth, easy break-in is assured, and longer subsequent service life is promoted.

Used with great success on gears, shafts, pistons, piston rings, valves, cylinder linings, etc.

Protect structural steel, large fabrications with "Bonderite-quality" PARCO PRIME 47

Now, steel structures and big fabrications can have the benefits of Bonderite-quality corrosion resistance and paint adhesion. Parco Prime 47 can be sprayed or brushed on, quickly conditions the metal to take and hold prime and finish coats. Recommended for bridges, tanks, truck and trailer bodies, structural steel, freight cars.

Clean your production with a cleansing and conditioning PARCO CLEANER

The Parker line includes alkali, acid and emulsion cleaners formulated not only to remove grease and soil but to condition the work for the next step in finishing as well. There's a Parco Cleaner to meet your conditions of soil, production requirements and finishing operations.

Use PARCOLAC to stain, wax, or oil-finish parts

This group of products is made up of various finishes for use after Parco Compound. Includes wax base finishes, stains, and rust preventive oils suitable for application by dip, spray or centrifuge. Can meet fast or slow drying requirements. Parcolacs add to appearance and performance qualities of articles treated.

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New Products

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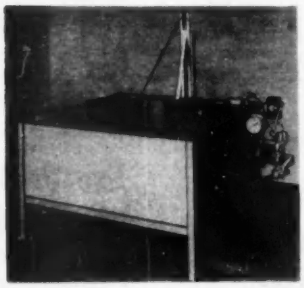
(*Continued from page* 142)

economy, as leaner gas mixtures can be ignited. At the same time, it is claimed that the resistor plugs eliminate electrical interference with radio reception. *The Electric Auto-Lite Co.*

Circle P-12 on page 81 for more data

Radiator Cleaning Tank

Now available is a radiator cleaning tank designed to enable cleaning of radiators for repairing by the hot chemical method.



Called the Model J-1, this tank is said to offer such mechanical features as a 12-gage steel tank, encased in one in. of insulation and steel outer tank; a large useable inside space; and an immersion type burner which gives even, economical heat. It is claimed that four to six average-size radiators can be cleaned in the new tank at one time. *Inland Mfg. Co.*

Circle P-13 on page 81 for more data

Moisture Grid for Operating Top and Windows

A device that automatically raises convertible tops and automatic windows—the instant it starts to rain—has been announced. It has a micro-moisture grid which may be installed on any exposed part of the car. Called Auto-Up, the assembly consists of: control box; manual on and off switch; automatic cut-off switch; micro-moisture grid; control box mounting bolts; and wire necessary for installation. *Superior Engineering Corp.*

Circle P-14 on page 81 for more data

(*Turn to page* 148, *please*)

Ride to greater sales on

Cr-V steel elliptic springs

Heavy-duty truck and bus manufacturers all agree:

Elliptic springs of Cr-V steel contribute a great deal to customer satisfaction, thus to greater sales.

Superior performance has earned this popularity. Elliptic springs of chromium-vanadium steel combine high flexibility, light weight, and low long-run cost with the fatigue strength to give long life under high stresses.

Build this superior combination into *your* heavy-duty automotive equipment—specify Cr-V steel elliptic springs.

And if you have a particularly difficult application problem on the use of alloy steels for heavy-duty springs—or on any other vital automotive components—get in touch with your nearest Vanadium Corporation office. They will be glad to put their experience to work for you.

Call or write today.

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New Products

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(Continued from page 146)

Heavy-Duty Truck Mirrors

Recently announced is a line of heavy-duty mirrors for trucks, buses, and tractors. They are available in five head styles and two types of mounting brackets.

Both bracket types are supplied on heavy, tubular steel housings with telescopic adjustment from 13 in. to 27½ in. Machined collars are built to close tolerances for easier adjustment and secure, vibrationless fit.

All mirrors are available with either clear or non-glare glass. Round styles of mirrors are made in five-in. size with steel rim, and both five and six-in. sizes with rubber rim. The latter is said to protect mirror edges from blows and hold the mirror and metal back firmly together to eliminate vibration in rough travel.

Round mirrors have the swivel head set at the center back. Rectangular styles (4 in. x 8 in. and 5 in. x 9 in.) have offset swivel ball joints for wider range of vision and greater adjustability. Both rectangular mirrors are made with the rubber rim only. *Auto Lamp Mfg. Co.*

Circle P-15 on page 81 for more data

Spark Plug Cleaner

Recently introduced is Model "A" spark plug cleaner and indicator, which is said to provide fast, efficient spark plug cleaning and show relative operating efficiency of used compared with new plugs. It indicates when spark plugs need replacement for improved engine performance.

Attractively designed, and finished in blue, orange and white, the Model "A" cleaner and indicator is described

(*Turn to page* 150, *please*)

New Products

For additional information please use postage-free reply card on page 81

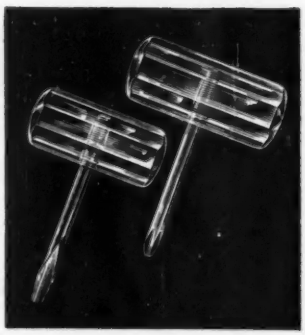
(*Continued from page* 148)

by the manufacturer as an important spark plug service unit. It is 20 in. high, 18 in. wide, and 14¾ in. deep. Shipping weight is 50 lb. *AC Spark Plug Div., General Motors Corp.*

Circle P-16 on page 81 for more data

Screwdrivers

A line of screwdrivers incorporate a Fist-Fit handle that reportedly makes it easy to loosen tight or frozen screws. Blades are only 2½ in. long to enable use in close quarters.



Multigrip screwdrivers are available in two sizes for Phillips screws and two sizes for slot screws. *Herbrand Div., The Bingham-Herbrand Corp.*

Circle P-17 on page 81 for more data

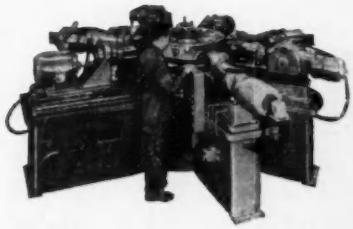
Light Switch Clip

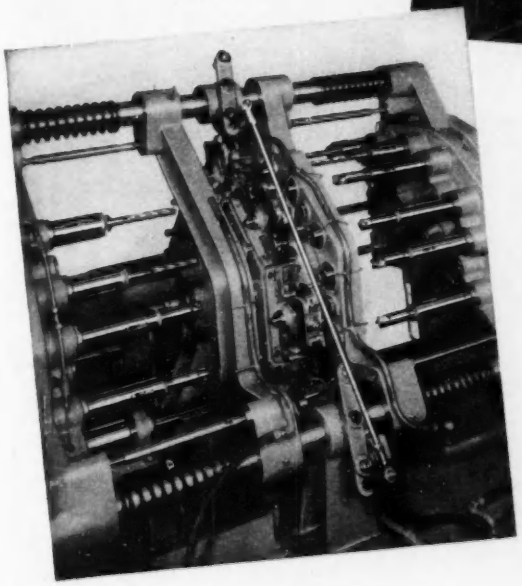
Better and faster mounting of assemblies in blind locations, which allow access from only one side, is said to be made possible by a clip now used to retain the dome light switch to the center pillar on a certain make automobile.

The clip, C20655-017, is made of spring steel material, is heat-treated, and reportedly affords a fast, simple, foolproof assembly. The dart portion of the clip is inserted into a .187-diam hole in the dome light switch. The switch is then snapped into the center pillar panel to complete the assembly. There are two clips in each unit. *Tinnerman Products, Inc.*

Circle P-18 on page 81 for more data

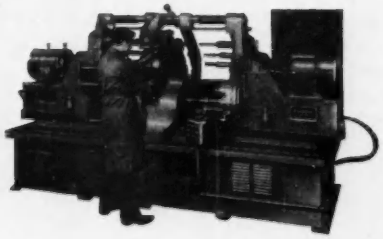
closeups of drilling & tapping PRODUCTION





The Hartford Special machine above is drilling, tapping and chamfering side pad holes in compressor rear frames.

The machine at the left, using a vertical dial, is core drilling, rough and finish reaming, rough and finish facing and chamfering two rockers simultaneously.



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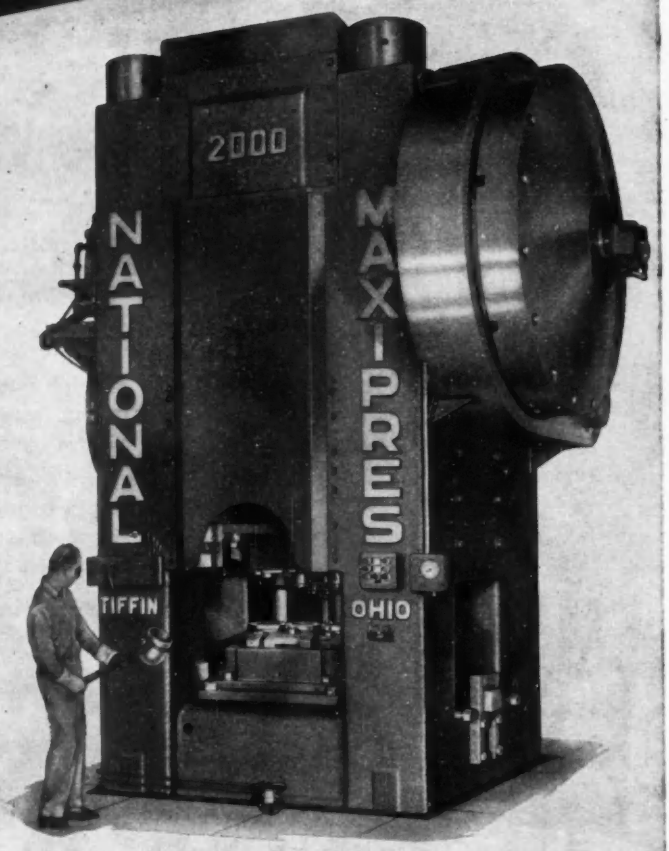
HARTFORD *Special*

SUPER-SPACERS

Automatic THREAD ROLLERS

THE HARTFORD SPECIAL MACHINERY CO., HARTFORD 12, CONN.

WHY DO FORGEMEN LIKE THE NEW MAXIPRES?



Because NATIONAL has engineered *23 distinctly new forging press features* into the new MAXIPRES, including:

Disc Brake
Water-cooled, trouble-free.

High-Capacity Clutch
Indestructible driving keys, 23% more ability.

Bigger Eccentric
Shaft strength 30% greater.

Tonnage Indicator
Blow-by-blow reading in tons.

Most modern forge shops have always preferred the MAXIPRES for its rugged construction and reliable operation, *plus* NATIONAL'S superiority in die design and service.

Now—the *new* MAXIPRES, *designed for the times*, is ready to fulfill the expanding requirements of the fast-moving forging industry.

MAXIPRESSES are available in 13 sizes from 300- to 8,000-ton.

NATIONAL
MACHINERY COMPANY
TIFFIN, OHIO.

DESIGNERS AND BUILDERS OF MODERN FORGING MACHINES—MAXIPRESSES—COLD HEADERS—AND BOLT, NUT, RIVET, AND WIRE NAIL MACHINERY

Hartford Detroit Chicago

Stalwart Rubber Parts

WILL MEET THE NEED!

PRECISION RUBBER PARTS BY **STALWART** are meeting the automotive industry's current rigid requirements . . . and they will continue to do so in the future. **STALWART** engineers are working constantly to develop new compounds and fabricating techniques which will produce even better rubber parts for tomorrow's autos and aircraft.

Today, **STALWART** is prepared to mass-produce precision parts from rubber stocks specially compounded for maximum resistance to extreme temperatures, oils and gasoline, chemicals, weathering or abrasion . . . as well as from the new extreme temperature Silicones. These parts can be molded, extruded, punched, machine-cut and mandrel-built to meet individual as well as S.A.E. and A.S.T.M. specifications.

When your design calls for rubber parts, you can depend on **STALWART** to meet the need!

Write today for Catalog 51SR-1 for additional information.

842-SR

STALWART RUBBER COMPANY

200 Northfield Road • Bedford, Ohio

TODAY

—complete output of the SONOTONE-designed Sintered-Plate Nickel Cadmium storage battery is consigned to the United States Government exclusively.

TOMORROW

— this great new battery — developed and now being produced by SONOTONE—will be made available to American industry for civilian use. Inquiries regarding its availability for defense contracts and eventual commercial use are invited.

the battery the world is waiting to use

BATTERY DIVISION

SONOTONE CORPORATION

Elmsford, New York

Deadening decibels in the '52 FORD

Have you noticed how much easier it is to carry on a conversation in today's cars? Acoustical engineers have made great strides in eliminating noises we used to associate with motoring.

Sound deadener pads are bonded wherever large metal areas tend to amplify sounds. A special 3M adhesive, for example, holds sound absorbing glass fiber pads on hood and roof panels. These adhesives provide a swift, economical life-time bond, and are typical of the specialized compounds 3M supplies to the automotive industry.

Specialized compounding knowledge coupled with on-the-spot technical service, has made 3M the foremost supplier of adhesive products to Ford and others in the automotive industry. Why not draw upon this reserve of experience whenever you're considering the use of adhesives or sealers? There's a 3M representative calling in your area regularly.

See what adhesives can do for you . . .
Get your copy of our 32-page manual showing typical cost-cutting applications, with description and physical properties of a wide range of adhesives, coatings, and sealers. Write Dept. 1012, 411 Piquette Avenue, today!

FIFTIETH ANNIVERSARY
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Now STANDARDIZED

For . . .

Gear Reduction Units
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If *you* have a shaft sealing problem, Gits experience in these and many other specific applications can prove of great and immediate value to you.

Write today for FREE illustrated Brochure, or send us your seal problem.

*Cartridge Seal . . . pressure balanced . . . requiring only 25% more space than lip-type seals.

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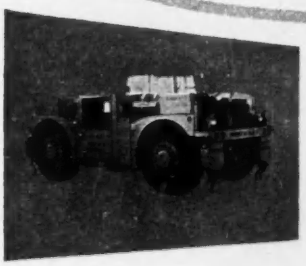
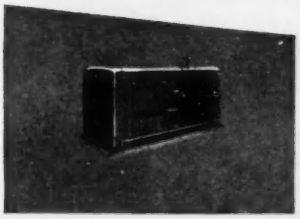
Gits Lubricating Devices,
The Standard For Industry For Over 40 Years

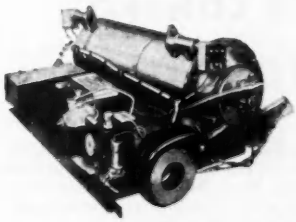
if it's worth starting...





IT'S WORTH EQUIPPING WITH JANITROL

liquid heaters

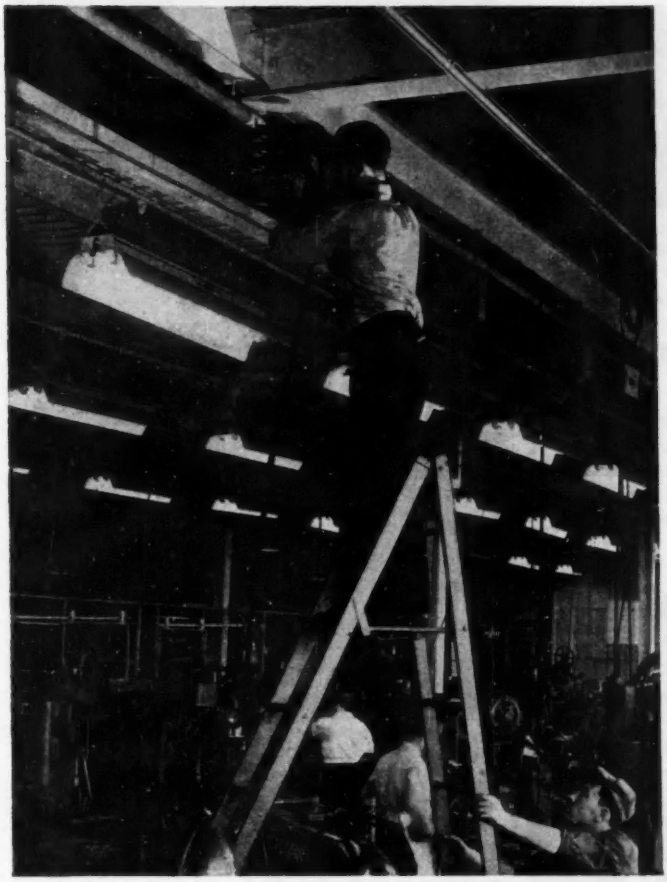


If you want to make sure that a military or commercial vehicle is fully equipped to start and function over the entire range of operating conditions—right down to 65°F below zero—write *Janitrol liquid heaters* into the specifications. Recent tests under the severest operating conditions have proved beyond question that the new 90,000 Btu-per-hour capacity Janitrol liquid heaters insure positive starting without special fuel capsules—at minus 65°F after a 72-hour cold soak. On the A-2 bomber towtug, for instance, in 65°F below zero weather the engine can be started and the towtug rolling well within 30 minutes after heater is switched on—or the heater can be used to raise the engine temperature to 160°F and maintain standby warm engine and operating parts in any weather. In addition to assuring *all-weather operation* Janitrol liquid heaters extend engine life and cut maintenance by preventing sludge formation and other deteriorating effects resulting from low operating temperatures. Call your nearby Janitrol representative for prompt help on any automotive or aircraft heating requirements.

HEAT WHEREVER YOU WANT IT **Janitrol**

AIRCRAFT-AUTOMOTIVE DIVISION SURFACE COMBUSTION CORP., TOLEDO 1, OHIO

F. H. Scott, 225 Broadway, New York, N. Y. • C. B. Andersen, 2201 Grand Ave., Kansas City, Mo. • L. A. Curtin, 7046 Hollywood Blvd., Hollywood, Calif. • F. H. Scott 4650 East-West Highway, Washington, D. C. • Phil A. Miller; Frank Deak, USAF Coordinator, Central District Office, 400 Dublin Ave., Columbus, Ohio • Headquarters, Toledo, Ohio



Machines may be installed or moved without rewiring or power shutdown. Machine is simply positioned, then tapped into *live power* by inserting protective plug into convenient opening in BUStribution DUCT.

Tap live power anywhere along BUStribution DUCT.

1. Choose location in duct.

Duct has regularly spaced, crescent-shaped openings on *both sides*, on average 10" centers. This permits spacing of plugs close to machine locations; gives better current density distribution on bus bars; obtains uniform and better heat dissipation between bus bars and casing. Plug-In openings are covered by embossed plates swiveled to casing on rivets which permit covers to be rotated through 180 degrees.

2. Connect machine and engage Bus Plug.

Crescent shape of Plug-In openings assures proper polarization of the Plug-In devices. Plug contact fingers are staggered so that plug may be inserted in openings in only one way. The steel side channels of the plug provide a means of grounding for greater safety, and supply support until plugs are bolted to duct. Bus bars and plugs' current-carrying parts are silvered, assuring perfect connections.

No costly down-time with BullDog Plug-In BUStribution!

Install or move machines anywhere, any time, without shutting off power. Simply pull plug that supplies power to machine from duct; move machine; plug in at new location. Connections between machines and duct runs are made easily, rapidly. No current outages. *No disruption of production schedules!*

With BUStribution DUCT systems, original installations are faster and more economical. Parts are factory-built, flexible, easy-to-handle units that are delivered ready to install. No cutting, threading, bending of material is necessary on the job. Long, heavy cable and conduit home runs are eliminated, along with time-consuming fishing and pulling in of bulky cables.

For unlimited leeway in machine distribution and plant layout changes, get Plug-In BUStribution DUCT. Call in a BullDog Field Engineer, or write BullDog direct for free, comprehensive Bulletin B-755.

BULLDOG

BULLDOG ELECTRIC PRODUCTS COMPANY
DETROIT 32, MICHIGAN • FIELD OFFICES IN ALL PRINCIPAL CITIES
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SPECIAL APPLICATION PROBLEM?

● Send us your specifications and let us quote for you. Standard's long experience assures reliable workmanship for the most unusual requirements.

Regardless whether the application is large or small, Standard can give you the long-life, trouble-free solution. Standard locknuts and lockwashers have a well-deserved reputation for the rugged endurance and precise locking that are vitally essential to long, efficient bearing assembly life.

Naturally, call on Standard for regular S.A.E. sizes of locknuts and lockwashers, too.

Write today for Standard's detailed Bulletin No. 30

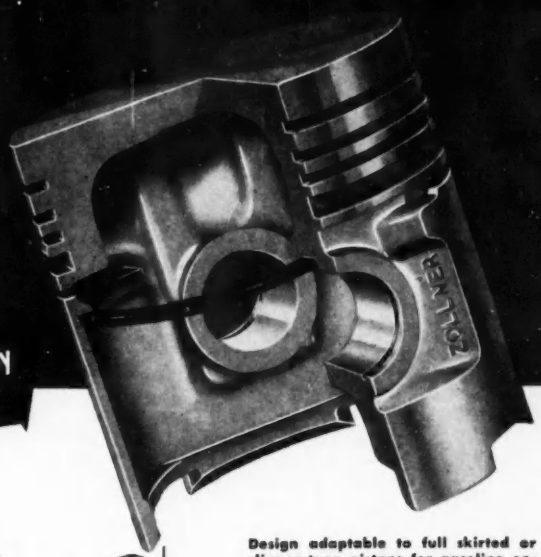
STANDARD **Locknut and Lockwasher, Inc.**
510 NORTH CAPITOL AVE. • INDIANAPOLIS 4, INDIANA

CLEAR○MATIC*

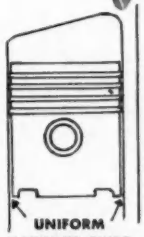
STEEL TENSION MEMBER

anchored only at pin bosses
and cast in positive contact
with I. D. of piston skirt

Controls Clearance Automatically



Engine Builders, everywhere are heralding the newest accomplishment of Zollner engineers. Now pistons can be *fitted to less than .001 clearance with positive uniformity of skirt bearing under all temperatures.* The steel tension member incorporates in the aluminum piston the same effective expansion as the ferrous cylinder itself. The amazing new CLEAROMATIC Piston results in a *quiet engine, with no cold slap, reduced friction, without any sacrifice of durability or heat conductivity.* We suggest an immediate test of these advantages for your engine, now. CLEAROMATIC Pistons bring the advanced engine performance of tomorrow here today!



UNIFORM EFFECTIVE SKIRT CLEARANCE AT ALL TEMPERATURES

Design adaptable to full skirted or slipper type pistons for gasoline engines for every purpose.

1. Clearance maintained uniformly at all coolant temperatures from 20° below zero to 200° F.
2. Effective expansion identical with ferrous cylinder.
3. Steel tension member, with same effective expansion as cylinder, maintains uniform skirt clearance through entire temperature range.
4. Normal diametral clearance usually less than .001 with uniform skirt bearing.
5. Durability and conductivity comparable to heavy duty design.

ZOLLNER

- ADVANCED ENGINEERING
- PRECISION PRODUCTION In Cooperation with Engine Builders

The Original Equipment **PISTONS**

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